



## Uranium Leasing Program

# Programmatic Environmental Assessment

July 2006



U.S. Department  
of Energy

## Office of Legacy Management

**Uranium Leasing Program  
Draft  
Programmatic Environmental Assessment**

July 2006

# Contents

1			
2			
3	Abbreviations and Acronyms .....	ix	
4	Measurements and Conversions .....	x	
5	Glossary .....	xi	
6	Summary .....	xiii	
7	1.0 Introduction .....	1-1	
8	1.1 Background.....	1-2	
9	1.2 History of the Uranium Leasing Program .....	1-2	
10	1.3 Scope of the Environmental Assessment.....	1-5	
11	1.3.1 Proposed Actions .....	1-5	
12	1.3.2 Scoping Comments .....	1-8	
13	2.0 Purpose and Need for Action .....	2-1	
14	3.0 Description of Alternatives .....	3-1	
15	3.1 Elimination of Alternative Actions.....	3-1	
16	3.2 Expanded Program Alternative—Preferred Alternative.....	3-1	
17	3.3 Existing Program Alternative .....	3-3	
18	3.4 No Action Alternative.....	3-3	
19	3.5 Summary of Potential Activities.....	3-4	
20	3.5.1 Preoperational Activities.....	3-12	
21	3.5.1.1 Surface Exploration .....	3-12	
22	3.5.1.2 Mine-Site Preparation .....	3-13	
23	3.5.2 Operational Activities .....	3-15	
24	3.5.2.1 Surface-Plant Area Construction and Operation .....	3-16	
25	3.5.2.2 Mine Development and Operation .....	3-18	
26	3.5.3 Postoperational Activities .....	3-25	
27	3.5.3.1 Interim Shutdown Activities .....	3-25	
28	3.5.3.2 Permanent Shutdown Activities .....	3-26	
29	4.0 Affected Environment .....	4-1	
30	4.1 Environmental Setting .....	4-1	
31	4.2 Socioeconomics .....	4-11	
32	4.2.1 Population .....	4-11	
33	4.2.2 Housing .....	4-11	
34	4.2.3 Employment and Economic Structure .....	4-12	
35	4.3 Transportation.....	4-14	
36	4.4 Land Use.....	4-15	
37	4.4.1 Mining.....	4-15	
38	4.4.2 Recreation .....	4-16	
39	4.4.3 Timber Harvesting .....	4-16	
40	4.4.4 Agriculture and Grazing .....	4-17	
41	4.5 Air Quality .....	4-17	
42	4.6 Ground Water .....	4-17	
43	4.7 Surface Water .....	4-18	
44	4.8 Soils .....	4-20	
45	4.9 Vegetation.....	4-20	
46	4.10 Wildlife.....	4-22	
47	4.11 Cultural Resources.....	4-25	
48	4.12 Visual Resources .....	4-27	

1	4.13	Wilderness Areas .....	4-28
2	4.14	Noise .....	4-29
3	4.15	Wild and Scenic Rivers .....	4-31
4	4.16	Floodplains and Wetlands.....	4-31
5	4.17	Human Health.....	4-31
6	4.18	Environmental Justice.....	4-32
7	5.0	Environmental Impacts .....	5-1
8	5.1	Socioeconomics .....	5-1
9	5.1.1	Expanded Program Alternative.....	5-1
10	5.1.2	Existing Program Alternative .....	5-1
11	5.1.3	No Action Alternative.....	5-2
12	5.2	Transportation.....	5-2
13	5.2.1	Expanded Program Alternative.....	5-2
14	5.2.1.1	Radiological Transportation Impacts .....	5-6
15	5.2.1.2	Transportation Accidents .....	5-7
16	5.2.2	Existing Program Alternative .....	5-8
17	5.2.2.1	Radiological Transportation Impacts .....	5-10
18	5.2.2.2	Transportation Accidents .....	5-11
19	5.2.3	No Action Alternative.....	5-11
20	5.3	Land Use.....	5-12
21	5.3.1	Mining.....	5-12
22	5.3.1.1	Expanded Program Alternative .....	5-12
23	5.3.1.2	Existing Program Alternative.....	5-12
24	5.3.1.3	No Action Alternative .....	5-12
25	5.3.2	Recreation .....	5-13
26	5.3.2.1	Expanded Program Alternative .....	5-13
27	5.3.2.2	Existing Program Alternative.....	5-13
28	5.3.2.3	No Action Alternative .....	5-13
29	5.3.3	Timber Harvesting .....	5-14
30	5.3.3.1	Expanded Program Alternative .....	5-14
31	5.3.3.2	Existing Program Alternative.....	5-14
32	5.3.3.3	No Action Alternative .....	5-14
33	5.3.4	Agriculture and Grazing .....	5-14
34	5.3.4.1	Expanded Program Alternative .....	5-14
35	5.3.4.2	Existing Program Alternative.....	5-14
36	5.3.4.3	No Action Alternative .....	5-15
37	5.4	Air Quality .....	5-15
38	5.4.1	Expanded Program Alternative.....	5-15
39	5.4.2	Existing Program Alternative .....	5-16
40	5.4.3	No Action Alternative.....	5-16
41	5.5	Ground Water .....	5-16
42	5.5.1	Expanded Program Alternative.....	5-16
43	5.5.2	Existing Program Alternative .....	5-17
44	5.5.3	No Action Alternative.....	5-17
45	5.6	Surface Water .....	5-17
46	5.6.1	Expanded Program Alternative.....	5-17
47	5.6.2	Existing Program Alternative .....	5-18
48	5.6.3	No Action Alternative.....	5-18

1	5.7	Soils .....	5-19
2	5.7.1	Expanded Program Alternative.....	5-19
3	5.7.2	Existing Program Alternative .....	5-19
4	5.7.3	No Action Alternative.....	5-19
5	5.8	Vegetation.....	5-19
6	5.8.1	Expanded Program Alternative.....	5-19
7	5.8.2	Existing Program Alternative .....	5-20
8	5.8.3	No Action Alternative.....	5-20
9	5.9	Wildlife.....	5-21
10	5.9.1	Expanded Program Alternative.....	5-21
11	5.9.2	Existing Program Alternative .....	5-22
12	5.9.3	No Action Alternative.....	5-23
13	5.10	Cultural Resources.....	5-23
14	5.10.1	Expanded Program Alternative.....	5-23
15	5.10.2	Existing Program Alternative .....	5-24
16	5.10.3	No Action Alternative.....	5-24
17	5.11	Visual Resources .....	5-24
18	5.11.1	Expanded Program Alternative.....	5-24
19	5.11.2	Existing Program Alternative .....	5-25
20	5.11.3	No Action Alternative.....	5-25
21	5.12	Wilderness Areas .....	5-25
22	5.12.1	Expanded Program Alternative.....	5-25
23	5.12.2	Existing Program Alternative .....	5-26
24	5.12.3	No Action Alternative.....	5-26
25	5.13	Wild and Scenic Rivers .....	5-26
26	5.13.1	Expanded Program Alternative.....	5-26
27	5.13.2	Existing Program Alternative .....	5-26
28	5.13.3	No Action Alternative.....	5-27
29	5.14	Noise.....	5-27
30	5.14.1	Expanded Program Alternative.....	5-27
31	5.14.2	Existing Program Alternative .....	5-28
32	5.14.3	No Action Alternative.....	5-28
33	5.15	Floodplains and Wetlands.....	5-28
34	5.15.1	Expanded Program Alternative.....	5-28
35	5.15.2	Existing Program Alternative .....	5-29
36	5.15.3	No Action Alternative.....	5-29
37	5.16	Human Health.....	5-29
38	5.16.1	Expanded Program Alternative.....	5-29
39	5.16.2	Existing Program Alternative .....	5-30
40	5.16.3	No Action Alternative.....	5-30
41	5.17	Environmental Justice Considerations.....	5-32
42	5.18	Short-Term Uses Versus Long Term Impacts.....	5-32
43	5.19	Irreversible or Irretrievable Commitment of Resources .....	5-32
44	5.20	Comparison of Alternatives .....	5-32
45	5.21	Cumulative Impacts .....	5-39
46	6.0	Persons and Agencies Consulted.....	6-1
47	7.0	References .....	7-1
48			

## Figures

Figure 1–1. Regional Location of DOE Lease Tract Area .....	1–7
Figure 1–2. Uranium Leasing Program Lease Tract Map .....	1–9
Figure 3–1. Leaseholder Plan Review and Approval Process .....	3–9
Figure 3–2. Expanded Alternative Transportation Haul Routes.....	3–23
Figure 3–3. Existing Alternative Transportation Haul Routes .....	3–27
Figure 4–1. Gateway Lease Tracts.....	4–3
Figure 4–2. UraVan Lease Tracts .....	4–5
Figure 4–3. Paradox Valley Lease Tracts .....	4–7
Figure 4–4. Slick Rock Lease Tracts .....	4–9
Figure 4–5. Comparison of A-Weighted Sound Pressure Levels Associated With Different Sources of Noise .....	4–30

## Tables

Table 1–1. Cross Reference Numbers for DOE Lease Tracts .....	1–6
Table 3–1. Status of the Lease Tracts Under the Expanded, Existing, and No Action Alternatives .....	3–2
Table 3–2. Summary of Lease Tract Information.....	3–5
Table 4–1. Population in the Region of the Uranium Lease Tracts.....	4–11
Table 4–2. Housing Availability in the Region of the Uranium Lease Tracts .....	4–12
Table 4–3. Unemployment and Income Characteristics in the Region of the Uranium Lease Tracts.....	4–13
Table 4–4. Workforce Characteristics in the Region of the Uranium Lease Tracts .....	4–13
Table 4–5. Federal and State Listed, Endangered, Threatened, and Sensitive Plant Species Potentially Occurring on Lease Tracts.....	4–22
Table 4–6. Federal and State Listed Threatened, Endangered, and Sensitive Wildlife Species Potentially Occurring on Lease Tracts.....	4–23
Table 4–7. United States and the DOE Uranium Lease Tract Natural Background Radiation Doses.....	4–32
Table 4–8. Minority Populations in the Uranium Lease Tract Counties and Adjacent Counties .....	4–33
Table 4–9. Low-Income Population in the Uranium Lease Tract Counties and Adjacent Counties .....	4–33
Table 5–1. Transportation Statistics for Haul Route Segments—Expanded Program Alternative.....	5–4
Table 5–2. Expanded Alternative—Trucking Impacts on County Roads .....	5–6
Table 5–3. Radiation Doses to the Public From Shipments Under the Expanded Program Alternative.....	5–7
Table 5–4. Transportation Statistics for Haul Route Segments—Existing Program Alternative.....	5–9
Table 5–5. Existing Alternative—Trucking Impacts on County Roads .....	5–10
Table 5–6. Radiation Doses for the Public From Shipments Under the Existing Program Alternative.....	5–11
Table 5–7. Noise Levels (dBA) Used for Noise Assessment .....	5–27
Table 5–8. Radionuclide Concentrations in Waste Rock at Lease Tract 13.....	5–31

Table 5–9. Summary of Environmental Impacts .....	5–33
Table 5–10. Potential Impacts Across DOE Lease Tracts .....	5–37

## Appendixes

Appendix A	Scoping Comments
Appendix B	Plants and Wildlife Species Expected To Occur On Or Near DOE Lease Tracts
Appendix C	Guidelines for Bat Mitigation

End of current text



## Abbreviations and Acronyms

1		
2	AEC	U.S. Atomic Energy Commission
3	AQCC	[State of Colorado] Air Quality Control Commission
4	AUM	animal unit month
5	BLM	Bureau of Land Management
6	CDOT	Colorado Department of Transportation
7	CDMG	Colorado Division of Minerals and Geology
8	CDOW	Colorado Division of Wildlife
9	CDPHE	Colorado Department of Public Health and Environment
10	CEQ	Council on Environmental Quality
11	CFR	<i>Code of Federal Regulations</i>
12	dB	decibel
13	dBA	A-weighted sound level
14	DOE	U.S. Department of Energy
15	DOT	U.S. Department of Transportation
16	EA	Environmental Assessment
17	EIS	Environmental Impact Statement
18	EPA	U.S. Environmental Protection Agency
19	ERMA	Extensive Recreation Management Area
20	FONSI	Finding of No Significant Impact
21	ft	feet (foot)
22	Hz	hertz
23	L <sub>dn</sub>	day-night sound level
24	L <sub>eq</sub>	equivalent sound level
25	LHDs	load/haul/dumps
26	LM	Office of Legacy Management
27	mg/L	milligrams per liter
28	mrem/yr	millirem per year
29	MSHA	Mine Safety and Health Administration
30	NEPA	National Environmental Policy Act
31	NESHAPs	National Emission Standards for Hazardous Air Pollutants
32	NOI	Notice of Intent
33	NRC	U.S. Nuclear Regulatory Commission
34	PCA	Potential Conservation Area
35	pCi/g	picocuries per gram
36	PSD	Prevention of Significant Deterioration
37	rem	roentgen equivalent man (a unit of radioactive dose equivalent)
38	ROW	right-of-way
39	SHPO	State Historic Preservation Office
40	SRMA	Special Recreation Management Area
41	TDS	total dissolved solids
42	ULMP	Uranium Lease Management Program
43	ULP	Uranium Leasing Program
44	USACE	U.S. Army Corps of Engineers
45	USFWS	U.S. Fish and Wildlife Service
46	U.S.C.	<i>United States Code</i>
47	WSA	Wilderness Study Area
48		

# Measurements and Conversions

## Units of Measurement

Most measurements in this Environmental Assessment are presented in English units. Metric units are used for measurements that are too small to be expressed in English units or with data that were intended to be presented in metric units. The table below presents general mathematical values for conversion between measurement units.

*Measurement Conversion Chart*

If You Know	Multiply By	To Get	If You Know	Multiply By	To Get
<b>Length</b>					
inches	2.54	centimeters	centimeters	0.3937	inches
feet	0.3048	meters	meters	3.281	feet
miles	1.60934	kilometers	kilometers	0.6214	miles
<b>Area</b>					
square miles	2.589988	square kilometers	square kilometers	0.386102	square miles
<b>Volume</b>					
acre-feet	1,233.48	cubic meters	cubic meters	$8.107 \times 10^{-4}$	acre-feet
	43,560	cubic feet	cubic feet	$2.2957 \times 10^{-5}$	acre-feet
	325,850	gallons	gallons	$3.0689 \times 10^{-6}$	acre-feet
gallons	3.7854	liters	liters	0.26417	gallons
<b>Flow Rate</b>					
gallons per minute	0.003785	cubic meters per minute	cubic meters per minute	264.172	gallons per minute
	0.002228	cubic feet per second	cubic feet per second	448.831	gallons per minute

## Glossary

**Adit**—A nearly horizontal passageway leading into a mine.

**Animal Unit Month**—An animal unit is generally one of the following: one cow, one cow and one calf, one horse, or five sheep. One animal unit month (AUM) is the amount of forage required to support one animal unit for 1 month. The number of acres required for an AUM (expressed as acres per AUM) varies depending on factors such as range condition, rainfall, irrigation, and topography. Because of low rainfall and steep topography, a larger number of acres is required to support an AUM in the area of the lease tracts than on most public lands.

**Exposure**—The total quantity of radiation at a given point, measured in air. Also, a measure of gamma or x-rays at a certain location, based on the location's ability to produce ionization in air. The unit of exposure for x-rays and gamma radiation is the roentgen.

**Effective Dose Equivalent**—The sum of the products of absorbed dose and appropriate factors that account for differences in biological tissue damage produced by different kinds of ionizing radiation and its distribution in the body. The unit of effective dose equivalent is the rem.

**Gamma Radiation**—Short wavelength electromagnetic radiation originating in the nucleus of an atom; similar to x-rays but of higher energy.

**Incline/Decline**—A passageway leading into a mine and sloping upward or downward at an angle from the horizontal.

**Load/Haul/Dumps (LHDs)**—Equipment used for moving rock and debris in mines.

**Member of the Public**—An individual in a controlled or unrestricted area on the lease tracts. The individual would not be involved in mining operations but could be a receiver of radiation doses. Any individual receiving an occupational dose would not be considered a member of the public.

**Mine-Waste-Rock Pile**—Topographic feature associated with mining operations that contains host rock and naturally occurring radioactive material and usually is not cost effective to process further.

**Muck**—The loading and removal of ore or mine-waste-rock from a mine.

**rem** (derived from roentgen equivalent man)—The dosage of radiation that would cause the same biological effect as 1 roentgen of gamma-ray exposure.

**Shaft**—A near-vertical passageway leading into a mine from the surface of the ground.

**Skip**—The compartment(s) within a shaft used to transport personnel and/or ore and/or mine-waste-rock to the surface.

1 **Total Effective Dose Equivalent**—The sum of the deep-dose equivalent (for external exposure)  
2 and the committed effective dose equivalent (for internal exposure).  
3

4 **Vent**—A near-vertical passage leading into a mine that provides additional ventilation.  
5

6 **Working Level**—Any combination of short-lived radon daughters in 1 liter of air that results in  
7 the ultimate emission of  $1.3 \times 10^5$  million electron volts of potential alpha particle energy.  
8

9 **Working Level Month**—An exposure to 1 working level for 170 hours.  
10

# Summary

Pursuant to the National Environmental Policy Act (NEPA), the U.S. Department of Energy (DOE) Office of Legacy Management (LM) is evaluating its Uranium Leasing Program to determine a strategy for managing the program during the next 10 years. A key element in this determination is the assessment of environmental impacts attributable to lease tract operations and associated activities. The leasing program currently consists of 38 lease tracts, all located in southwestern Colorado; 13 leases are active and 25 are inactive. The 13 active leases are scheduled to expire in January 2007.

DOE is considering three alternatives for managing the lease tracts:

- *Expanded Program alternative* (DOE's preferred alternative). The existing leasing program would be expanded to include leasing of all DOE-managed lands. The 13 active lease tracts (more than 7,000 acres) would remain active, and DOE could offer the 25 inactive lease tracts to the domestic uranium industry through a competitive bid process. Individual lease tracts could be expanded to include all withdrawn lands, potentially more than 27,000 acres.
- *Existing Program alternative*. The existing 13 leases would be extended, and future operations would be limited to those that are currently authorized on the tracts and their subsequent reclamation.
- *No Action alternative*. Current leases would expire, and the existing lease operations would be reclaimed. Following reclamation, all 38 lease tracts would be restored to the public domain with the concurrence of and under the Bureau of Land Management's (BLM's) administrative control and the program would end.

The proposed alternatives would affect the environmental resources discussed in this Environmental Assessment (EA) to varying degrees. The following discussions present summaries of the impacts to the resources that the alternatives would have the most effect on. Chapter 5 of the EA presents a more detailed discussion of the effects to all applicable environmental resources.

## Socioeconomics

All alternatives would create additional jobs in areas affected by lease tract operations. The Expanded Program alternative would create the most jobs (up to 570) and would increase local wages. The Existing Program alternative would create fewer jobs (up to 186) and would also produce an increase in local wages. Both alternatives would bring a secondary economic benefit from local spending for goods and services. Up to 60 short-term (1 to 2 year) jobs would result from the No Action alternative, mostly from hauling stockpiled ore to the processing mills and reclaiming disturbed land.

## Transportation

Ore could be hauled to two currently licensed ore-processing mills—the Cotter Corporation Mill in Cañon City, Colorado, and the International Uranium Corporation's White Mesa Mill near Blanding, Utah. An increase in truck traffic (up to 150 haul trucks per day, one way, under the Expanded Program alternative and up to 50 haul trucks per day, one way, under the Existing Program alternative) hauling ore to the mills would bring an increased risk of traffic fatalities.

The resulting increases in annual fatalities and injuries were estimated under worst-case scenarios for all three alternatives. Under all alternatives, annual fatalities were estimated to be less than 1; traffic accident-related injuries were estimated to be 16 per year under the Expanded Program alternative, 5.4 per year under the Existing Program alternative, and less than 1 under the No Action alternative. Under the Expanded Program alternative, the annual dose to haul-truck drivers and members of the public from exposure to radioactive ore would result in an increase in cancer risk of less than 8 in 1 million and 1 in 10 million, respectively. Under the Existing Program alternative, a haul-truck driver would receive the same annual dose and risk as the Expanded alternative, but because of the reduced number of total shipments, the public risk would be reduced to 1 in 100 million. The increase in haul-truck traffic under the Expanded and Existing Program alternatives would also increase the amount of noise along the haul routes. On some routes that are designated as scenic byways, vehicle/animal accidents could increase commensurate with the increased number of haul trucks. In addition, the residents living near the lease tracts or along the collector routes would likely see an increase in the amount of dust generated by the increased haul-truck traffic.

## **Mining**

Under the Expanded and Existing Program alternatives, uranium and vanadium ores would be immediately available, and new reserves might be discovered. Under the No Action alternative, uranium and vanadium ores would continue to be available over the long term but would not originate from DOE leases.

## **Noise, Dust, and Air Quality**

The Expanded and Existing Program alternatives would produce a limited increase in localized noise and dust near mine sites and along dirt haul roads, which could affect recreational users, especially near the Dolores River Canyon. An increase in visible dust and surface disturbances would also affect visual resources. Local fugitive dust could decrease air quality slightly near the source areas, but regional air quality would not be affected under either alternative. The No Action alternative would decrease noise, dust, and human activity at all lease tracts and may result in an increase of recreation activities.

## **Agriculture and Grazing**

The Expanded Program alternative would result in surface disturbance of no more than 450 additional acres (in addition to the 300 acres of existing disturbance), and, if all leases were in active operation under the Existing Program alternative, an additional 110 acres would be disturbed. This acreage represents less than 2 percent of the total area under DOE lease tracts. These small, discontinuous losses in acreage would not significantly affect the volume of forage in grazing allotments that include the lease tracts. Because most mining activities occur in lands not suitable for crops, there would be no impacts to agriculture. However, there would be impacts to range management, such as increased traffic through allotments to mine sites that could include animal/vehicle accidents, disruption of normal livestock trailing/movement from mine development, and damage to or increased maintenance requirements for access roads. These potential impacts could be mitigated with range improvements such as cattle guards and fences. After successful reclamation, as many as 300 additional acres could become available for grazing. Weed invasion could potentially affect this forage base, but DOE has a proactive

1 noxious weeds control program that is coordinated with the Montrose County Weed Program  
2 and the San Miguel Basin Weed Program.

### 3 4 **Soils**

5  
6 Surface disturbance under the Expanded Program and Existing Program alternatives could  
7 produce an increase in soil erosion, but storm water runoff management during operations and  
8 reclamation of disturbed areas after mining operations ceased would mitigate these efforts.  
9 Reclamation of the existing 300 acres of disturbed areas under the No Action alternative would  
10 decrease the potential for soil erosion. New surface-disturbing activities on the lease tracts would  
11 require review and approval of DOE and affected agencies, such as the Colorado Division of  
12 Wildlife, U.S. Fish and Wildlife Service, the State Historic Preservation Officer, BLM, and the  
13 Colorado Division of Minerals and Geology.

### 14 15 **Vegetation**

16  
17 Mining operations under the Expanded Program and Existing Program alternatives would disturb  
18 no more than an additional 450 acres and 110 acres, respectively, of land containing various  
19 amounts of upland vegetation and cryptobiotic soils. All impacts would be to small (5 to  
20 10 acres) isolated acreages. This area of disturbance represents less than 2 percent of the total  
21 acreage in DOE's lease program. The remainder would be undisturbed by mining activities. The  
22 degree of impact would depend on the areas disturbed. Beneficial impacts may result from  
23 successful reclamation of previously degraded or species-poor areas. Negative impacts may  
24 result in previously diverse, healthy areas or in areas containing sensitive species, although  
25 negative impacts would be somewhat mitigated by successful reclamation. All disturbed areas  
26 would be reclaimed with the concurrence of BLM before restoring to the public domain. Weed  
27 invasion would be expected to increase in disturbed areas and in areas where vehicle traffic  
28 would facilitate the spread of weed seed, particularly before reclamation is successful; however,  
29 DOE has a proactive noxious weeds control program.

### 30 31 **Wildlife**

32  
33 Of the three alternatives, the Expanded Program alternative would have the most effect on  
34 wildlife that inhabits the lease tracts, as up to 450 additional acres of land would be disturbed.  
35 The Existing Program alternative would result in less effect (up to 110 additional acres). In  
36 disturbed areas, short-term habitat would be lost as a result of vegetation removal, surface  
37 disturbance, and blasting on 5 to 10 acres per lease. The remaining lands, several thousand acres,  
38 would remain undisturbed, although mining activities would be expected to impact wildlife  
39 (e.g., noise, light, traffic, road kill, disruption of migration routes). Reopening of abandoned  
40 mine entrances and other structures could potentially result in disturbance to populations of  
41 sensitive species of bats and reptiles but would be conducted in a manner, as directed by DOE,  
42 that would avoid or minimize such impacts.

43  
44 Under the No Action alternative, most area wildlife species would benefit over the long and short  
45 terms because cessation of operations would reduce or eliminate noise, traffic, and human  
46 activity from the lease tracts. Under all three alternatives, permanent mine closures could destroy  
47 potential bat habitats; conversely, however, the fabrication and installation of bat gates and  
48 grates in mine openings could greatly increase the availability of such habitats.

## **Cultural Resources**

Under the Expanded Program alternative, approximately 9 to 12 cultural resource sites could be expected to occur within areas of new disturbance. Under the Existing Program alternative, approximately two to three sites could occur within areas of new disturbance. Those sites that could not be avoided by the leaseholder could be destroyed, but information about the site would be preserved through data collection and documentation or other mitigative measures following consultation with BLM. The No Action alternative would benefit cultural resources, as cultural sites would not be disturbed.

## **Human Health**

Risk estimates of latent cancer fatalities were calculated for the Expanded Program and Existing Program alternatives for a member of the public living near an underground uranium mine, a member of the public living near an open pit uranium mine, and workers receiving an occupational dose. Risk under the No Action alternative was calculated for a member of the public visiting a lease tract and camping for 14 days on a mine-waste-rock pile. For all risk scenarios, estimated latent cancer fatalities were less than one for members of the public. For workers at the lease tracts, estimates of latent cancer fatalities were less than one for the Existing Program and No Action alternatives. Under the Expanded Program alternative, the risk estimate is one latent cancer fatality for workers, based on 570 workers each receiving an annual radiation dose of 350 millirems during a 10-year period.

This EA evaluates the impacts of the proposed alternatives on the environmental resources that currently exist. If any future decisions concerning the lease tracts affect additional environmental resources, DOE would prepare a more detailed NEPA analysis.



## 1.0 Introduction

The U.S. Department of Energy Office of Legacy Management (DOE-LM) is evaluating the Uranium Leasing Program (ULP) to determine its management goals and objectives for the next 10 years for DOE's withdrawn lands and government-owned patented claims (referred to as DOE-managed lands) for the exploration and production of uranium and vanadium ores.

This draft programmatic Environmental Assessment (EA) was prepared to support DOE-LM's decision making for the future of the ULP, under the regulations and guidelines for compliance with the National Environmental Policy Act (NEPA) of 1969 (Title 42 *United States Code* [U.S.C.] Section 4321 et seq.), the Council on Environmental Quality (CEQ) regulations for implementing NEPA (Title 40 *Code of Federal Regulations* [CFR] Parts 1500 through 1508 [40 CFR 1500–1508]), and DOE's implementing procedures for NEPA compliance (10 CFR 1021). DOE-LM is distributing the draft EA to interested members of the public; federal, state, and local agencies; and potentially affected tribes for review and comment prior to issuing the final document and making subsequent decisions on the ULP.

DOE is required by the National Historic Preservation Act (Title 16 U.S.C. Section 470) and Executive Orders 13007 (*Indian Sacred Sites*) and 13175 (*Consultation and Coordination with Indian Tribal Governments*) to consult with Native American tribes concerning potential effects of federal actions on traditional cultural properties and sacred sites. In February 2006, DOE contacted federally recognized Native American tribes that resided in or had cultural ties to ULP lands to inform them of DOE's proposed alternatives. DOE is currently in the process of soliciting input from the Southern Ute Tribe, Ute Mountain Ute Tribe (including the White Mesa Utes), Uintah-Ouray Ute Tribe, Hopi Tribe, and Navajo Nation. Summaries of these consultations will be presented in the final EA.

Because this document is a programmatic EA (as defined in DOE and CEQ regulations at 10 CFR 1021.330 and 40 CFR 1502.4[b]) to support DOE-LM's decision making on whether or not to continue the ULP, it provides a level of detail commensurate with this process. It does not attempt to assess the site-specific impacts that might occur on individual lease tracts of the DOE-managed lands. As has been the practice in the past, should DOE-LM decide to continue the ULP, all leaseholders would be required to submit site-specific proposed plans of operation, in the form of exploration plans and/or mining plans, to DOE for review prior to initiating any surface-disturbing activities. Upon receipt of such a plan, DOE-LM would review the plan in accordance with DOE's implementing NEPA regulations and DOE's NEPA procedures, existing environmental regulations, the lease agreement, and standard industry practices. This review process includes an on-site examination of the leaseholder's proposed activity. On the basis of this review, DOE would determine if the plan should be approved or disapproved.

This draft programmatic EA evaluates the following alternatives:

- Expanded Program Alternative (DOE's preferred alternative)—continue leasing the 13 existing active lease tracts and offer leases on up to 25 more lease tracts to the domestic uranium industry.
- Existing Program Alternative—continue leasing the 13 existing active lease tracts.
- No Action Alternative—allow existing leases to expire, reclaim all sites, and return land management to the Bureau of Land Management (BLM).

1  
2 The remainder of this section provides background (Section 1.1) and history of the ULP  
3 (Section 1.2) and presents a summary of the results of the scoping process (Section 1.3)  
4 employed to solicit public and agency input to this draft EA. Section 2.0 provides a statement of  
5 the purpose and need for agency action. Section 3.0 presents the alternatives assessed in this  
6 draft EA. Section 4.0 presents characterizations of the affected environments on and adjacent to  
7 the lease tracts. Section 5.0 provides an assessment of the impacts that would result from  
8 implementing each of the alternatives and a comparison of impacts among the alternatives.  
9

## 10 **1.1 Background**

11  
12 The ULP began after World War II and became the responsibility of DOE in 1974. Section 1.2  
13 presents a summary of the history of the program. DOE issued an EA in 1995 (DOE 1995) that  
14 helped determine its management approach for the ULP through 2005. Thirteen leases awarded  
15 under that assessment will expire in January 2007. As a result, and consistent with its regulations  
16 and guidelines, DOE must decide the future of this program over the next 10 years. This EA  
17 supports the decision making by providing DOE with an assessment of the environmental  
18 impacts of continuing or discontinuing the program.  
19

20 In accordance with NEPA and with CEQ and DOE implementing regulations and prior to  
21 making any final decision, DOE will evaluate the alternatives presented in this draft EA,  
22 consider public and agency comments on this draft, and then determine whether a finding of no  
23 significant impact (FONSI) is warranted or whether an environmental impact statement (EIS) is  
24 required.  
25

## 26 **1.2 History of the Uranium Leasing Program**

27  
28 In the post-World War II era, Congress directed DOE's predecessor agency, the U.S. Atomic  
29 Energy Commission (AEC), to develop a supply of domestic uranium that would adequately  
30 meet the nation's defense needs. That responsibility was met through the Ore Purchase Program,  
31 the Exploration Program, and the Mineral Leasing Program. Provisions of these programs gave  
32 AEC the authority to withdraw federal lands for the exploration and development of a viable  
33 domestic uranium source and were carried forward into the Atomic Energy Act of 1954.  
34

35 In March 1948, BLM issued Public Land Order (PLO) 459 that stated "Subject to valid existing  
36 rights and existing withdrawals, the public lands and the minerals reserved to the United States in  
37 the patented lands in the following areas in Colorado are hereby withdrawn from all forms of  
38 appropriation under the public-land laws, including the mining laws but not the mineral-leasing  
39 laws, and reserved for the use of the United States Atomic Energy Commission." Subsequently,  
40 BLM issued a number of other PLOs (all similar to PLO 459) that increased and/or decreased the  
41 total acreages in withdrawn status. In addition, the U.S. Government, through the Unions Mines  
42 Development Corporation, acquired a substantial number of patented and unpatented mining  
43 claims, millsites, tunnel sites, and agricultural patents in February 1949, until the aggregate  
44 acreage managed by AEC totaled approximately 25,000 acres. During this time, AEC's  
45 management authority was quite broad.  
46

1 The Mineral Leasing Program (circa 1949–1962) produced more than 1.2 million pounds of  
2 uranium and 6.8 million pounds of vanadium and generated \$5.9 million in royalties to the  
3 federal government. When the program ended in 1962, AEC directed the leaseholders to close  
4 the mines, but little was done to reclaim the mine sites.

5  
6 In 1974, AEC initiated a second leasing program under the Domestic Uranium Program  
7 regulations (10 CFR 760.1) that was markedly different from the previous leasing program. The  
8 new program, the Uranium Lease Management Program (ULMP), was designed to address the  
9 lack of production capacity of uranium- and vanadium-bearing ores for U.S. Government  
10 defense needs and emphasized the need for uranium in the expanding commercial nuclear energy  
11 market. Two main goals of the ULMP were to recover the resources that had been developed  
12 initially by AEC and to improve the prospects for continued mill operations, thereby encouraging  
13 further exploration and development on privately held land. In preparation for the ULMP, AEC  
14 prepared the *Environmental Statement, Leasing of AEC Controlled Uranium Bearing Lands*  
15 (AEC 1972) that presented assessments of the various environmental and economic aspects of  
16 the leasing program. That document recognized the multiple-use aspects of the public lands,  
17 including those managed by AEC and deferred the authority for multiple-use activities to BLM.  
18 The document also acknowledged that the lands associated with the lease tracts accounted for  
19 less than 5 percent of the acreage within the Uravan Mineral Belt that would likely have  
20 exploration and mining activities. The bulk of those activities were expected to occur on public  
21 lands associated with new or existing mining claims (556,000 acres) and other private and state  
22 lands (21,000 acres). Accordingly, the level of activities expected to occur on other lands was  
23 identified as independent of AEC's leasing program.

24  
25 AEC and its successor agencies, the U.S. Energy Research and Development Administration and  
26 DOE, administered the ULMP. Forty-four lease tracts (38 in Colorado, 5 in Utah, and 1 in  
27 New Mexico) were included in the program. In 1974, 43 lease tracts were offered for lease  
28 through a competitive bid process; 1 lease tract (located in Utah) was excluded from the leasing  
29 process in 1974 and was never leased. The 38 lease tracts in Colorado are located in an area  
30 known as the Uravan Mineral Belt, which includes a significant, if not dominant, portion of the  
31 known domestic uranium ore reserves.

32  
33 During the ULMP, DOE controlled and administered the 43 lease tracts for the exploration and  
34 development of viable uranium and vanadium resources. As part of its administrative duties,  
35 DOE incorporated language into each lease agreement that required leaseholders to conduct  
36 operations in a manner to minimize adverse environmental effects and to comply with state and  
37 federal statutes and regulations. DOE was responsible for monitoring lease tract activities and  
38 enforcing the lease agreements. Lease language required the leaseholders, at their expense, to  
39 comply with all applicable statutes and regulations. Non-compliance could result in lease  
40 termination. To ensure that lease sites were adequately reclaimed, DOE required the leaseholders  
41 to secure a reclamation performance bond for each lease tract, payable to DOE upon default.  
42 These bonds were adjusted periodically to reflect the actual conditions present on each lease  
43 tract.

44  
45 During the ULMP, DOE and BLM acknowledged that each agency had defined jurisdictional  
46 authority over the various activities that could be conducted on the lease tracts. DOE maintained  
47 jurisdiction and authority over all activities on withdrawn lands associated with uranium and  
48 vanadium mining, including exploration, development, extraction (mining), and transportation.

1 BLM maintained jurisdiction and authority over all other surface uses. This acknowledgment of  
2 the agencies' jurisdiction continues today.

3  
4 In 1984, lease agreements were renewed (for a second 10-year term) for 33 of the original  
5 43 lease tracts. The renewed lease agreements were identical to the original agreements signed in  
6 1974 except for a separate renewal clause and amendments that modified the methods for  
7 calculating royalties. The leaseholders of the other 10 lease tracts completed the full reclamation  
8 of their respective operations.

9  
10 Between 1984 and 1994, three additional lease agreements were relinquished to or terminated by  
11 DOE, and the leaseholders of these three lease tracts completed the full reclamation of their  
12 respective sites. Between 1974 and 1994, the ULMP leaseholders produced approximately  
13 6.5 million pounds of uranium and 33.4 million pounds of vanadium. That production generated  
14 \$53 million in royalties to the federal government.

15  
16 By comparison, domestic annual uranium production peaked in 1980 at 43.7 million pounds, of  
17 which production from the DOE lease tracts (at 1.1 million pounds) represented about  
18 2.5 percent of the total.

19  
20 In 1994, the remaining 30 leases were allowed to expire, and DOE prepared a programmatic EA  
21 to determine if the leasing program should continue. During the EA process, the former  
22 leaseholders were allowed to continue maintenance, security, and reclamation activities at the  
23 lease tracts to ensure that the mines and associated facilities did not incur damage. Eight of the  
24 30 leaseholders notified DOE that they did not want to continue with the program and initiated  
25 final reclamation activities at their sites. Once these lease tracts were fully reclaimed, they were  
26 relinquished to DOE. Accordingly, the programmatic EA focused on the ultimate disposition of  
27 only 22 lease tracts. DOE's preferred alternative in the EA was the continued leasing of these  
28 22 lease tracts for an additional 10-year period. The *Final Environmental Assessment for the*  
29 *Uranium Lease Management Program* (DOE 1995) was approved in July 1995, and DOE issued  
30 the *Finding of No Significant Impact, Uranium Lease Management Program* on  
31 August 22, 1995. The 21 reclaimed lease tracts were excluded indefinitely from further leasing  
32 activities.

33  
34 The five lease tracts located in Utah were restored to the public domain by BLM in July 1999.  
35 The single lease tract located in New Mexico was restored to the public domain by BLM in  
36 November 1994.

37  
38 Subsequent to the FONSI, DOE prepared new lease agreements and entered into negotiations  
39 with the 22 previous leaseholders. Seven of the 22 leaseholders immediately notified DOE that  
40 they did not want to continue with the program and began final reclamation activities at their  
41 lease tracts. Once reclamation was completed, these seven leaseholders relinquished their lease  
42 tracts to DOE. Following negotiations, new lease agreements were executed for 12 lease tracts  
43 (effective March 20, 1996) and 3 additional lease tracts (effective January 27, 1997). This  
44 current leasing program is identified as the DOE ULP. In October 2000, the leaseholders of two  
45 lease tracts requested relinquishment of their respective tracts and initiated final reclamation  
46 activities. Once these sites were fully reclaimed, DOE approved the relinquishment.

47  
48 In October 1994, DOE initiated a significant mine-site reconnaissance and reclamation project  
49 on the lease tracts. Each lease tract was thoroughly inspected to identify all the abandoned mine

1 sites that resulted from pre-1974 leasing activities. Subsequent to this identification process, all  
2 the mining-related features associated with each site were quantified and assessed for their  
3 historic importance. In 1995, in the absence of specific guidance pursuant to the reclamation of  
4 abandoned uranium mine sites, DOE initiated discussions with BLM officials (state and local)  
5 that culminated in the establishment of a guidance document, *United States Department of*  
6 *Interior, Colorado Bureau of Land Management, Closure/Reclamation Guidelines for*  
7 *Abandoned Uranium Mine Sites*, for such sites. DOE's objective in establishing this guidance  
8 document was to ensure that DOE's lease tracts were reclaimed in a manner that was acceptable  
9 to BLM so that the lands could be restored to the public domain under BLM's jurisdictional  
10 authority. Subsequently, DOE's "legacy" mine sites were prioritized and systematically  
11 reclaimed. DOE consistently applied the aforementioned guidance document to its reclamation  
12 activities; in many cases, DOE exceeded the objectives that were used to establish those specific  
13 guidelines. Reclamation at the final legacy site was completed in May 2001. DOE reclaimed a  
14 total of 161 separate mine sites at a total cost of \$1.25 million.

15  
16 Currently, 13 lease tracts are still active and 25 lease tracts are inactive; all are located in  
17 southwestern Colorado (see Table 1-1 and Figures 1-1 and 1-2). Ore production on the active  
18 lease tracts resumed in May 2003 and continued into early November 2005, when production  
19 operations were suspended at the four lease tracts with active mining operations. During that  
20 time frame, those four operations produced approximately 65,500 tons of ore and generated  
21 \$4.0 million in royalties to the government. Similar mining operations were being developed on  
22 three other lease tracts and, pending the resumption of operations, could be in production within  
23 6 months. If such levels of production continue into the foreseeable future, and the market prices  
24 for uranium and vanadium continue at or near current levels, it is anticipated that royalties  
25 generated from the existing program could total \$10 million annually.

26  
27 To put the DOE ULP into perspective in today's world market, production from the DOE lease  
28 tracts may approach 2.0 million pounds of uranium annually in a world market that produces  
29 approximately 100 million pounds of uranium annually.

## 30 31 **1.3 Scope of the Environmental Assessment**

### 32 33 **1.3.1 Proposed Actions**

34 This EA addresses the potential environmental concerns related to a policy decision that DOE is  
35 considering for the ULP. The three alternatives being considered are the Expanded Program  
36 alternative, the Existing Program alternative, and the No Action alternative.

37  
38 Under the Expanded Program alternative, which is DOE's preferred alternative, the existing  
39 leasing program would be expanded to include the leasing of all DOE-managed lands.  
40 Operations on the 13 active lease tracts would continue as they are presently authorized, and  
41 DOE would offer the 25 inactive lease tracts to the domestic uranium industry through a  
42 competitive bid process. Also, individual lease tracts could be expanded to include all withdrawn  
43 lands. The new lease agreements would require the leaseholders to comply with all applicable  
44 statutes and regulations and would allow the leaseholders to (1) conduct operations consistent  
45 with the exploration, development, and extraction (mining/production) of uranium and associated  
46 minerals; (2) transport ores from the lease tracts to ore-processing facilities; and (3) perform all

activities required to satisfactorily reclaim the environmental disturbances on the lease tracts resulting from their operations.

Table 1–1. Cross Reference Numbers for DOE Lease Tracts and Withdrawn Lands

Lease Tract Designation	Reference Number Used in EA	Lease Tract Designation	Reference Number Used in EA
C–JD–5	5	C–SR–16A	16A
C–JD–5A	5A	C–WM–17	17
C–JD–6	6	C–WM–17A	17A
C–JD–7	7	C–SM–18	18
C–JD–7A	7A	C–AM–19	19
C–JD–8	8	C–AM–19A	19A
C–JD–8A	8A	C–AM–20	20
C–JD–9	9	C–LP–21	21
C–SR–10	10	C–LP–22	22
C–SR–11	11	C–LP–22A	22A
C–SR–11A	11A	C–LP–23	23
C–SR–12	12	C–BL–23A	23A
C–SR–13	13	C–BL–23B	23B
C–SR–13A	13A	C–CM–24	24
C–SR–14	14	C–CM–25	25
C–SR–14A	14A	C–G–26	26
C–SR–15	15	C–G–26A	26A
C–SR–15A	15A	C–G–27	27
C–SR–16	16	C–G–27A	27A

C = Colorado; JD = Jo Dandy; SR = Slick Rock; WM = Wedding Bell Mountain; SM = Spring Creek Mesa; AM = Atkinson Mesa; LP = Long Park; BL = Bitter Creek/Long Park; CM = Club Mesa; G = Gateway.

Under the Existing Program alternative, the existing 13 leases would be extended, and future lease activities would be limited to operations that are presently authorized on those lease tracts and their subsequent reclamation. In addition, DOE would retain the 25 inactive lease tracts in their current status until all DOE-managed lands could be restored to the public domain with the concurrence of and under BLM’s administrative control.

Under the No Action alternative, the current leases would expire, and the existing lease operations would be reclaimed. Following reclamation, all 38 lease tracts would be restored to the public domain with the concurrence of and under BLM’s administrative control, and the program would end.

The 38 lease tracts discussed in this EA are distributed over four geographical areas located within Mesa, Montrose, and San Miguel Counties of southwestern Colorado. They are referred to as the Gateway lease tracts, the Uravan lease tracts, the Paradox Valley lease tracts, and the Slick Rock lease tracts. A discussion of the geographical features of these lease tract areas is presented in Section 4.1, “Environmental Setting.”

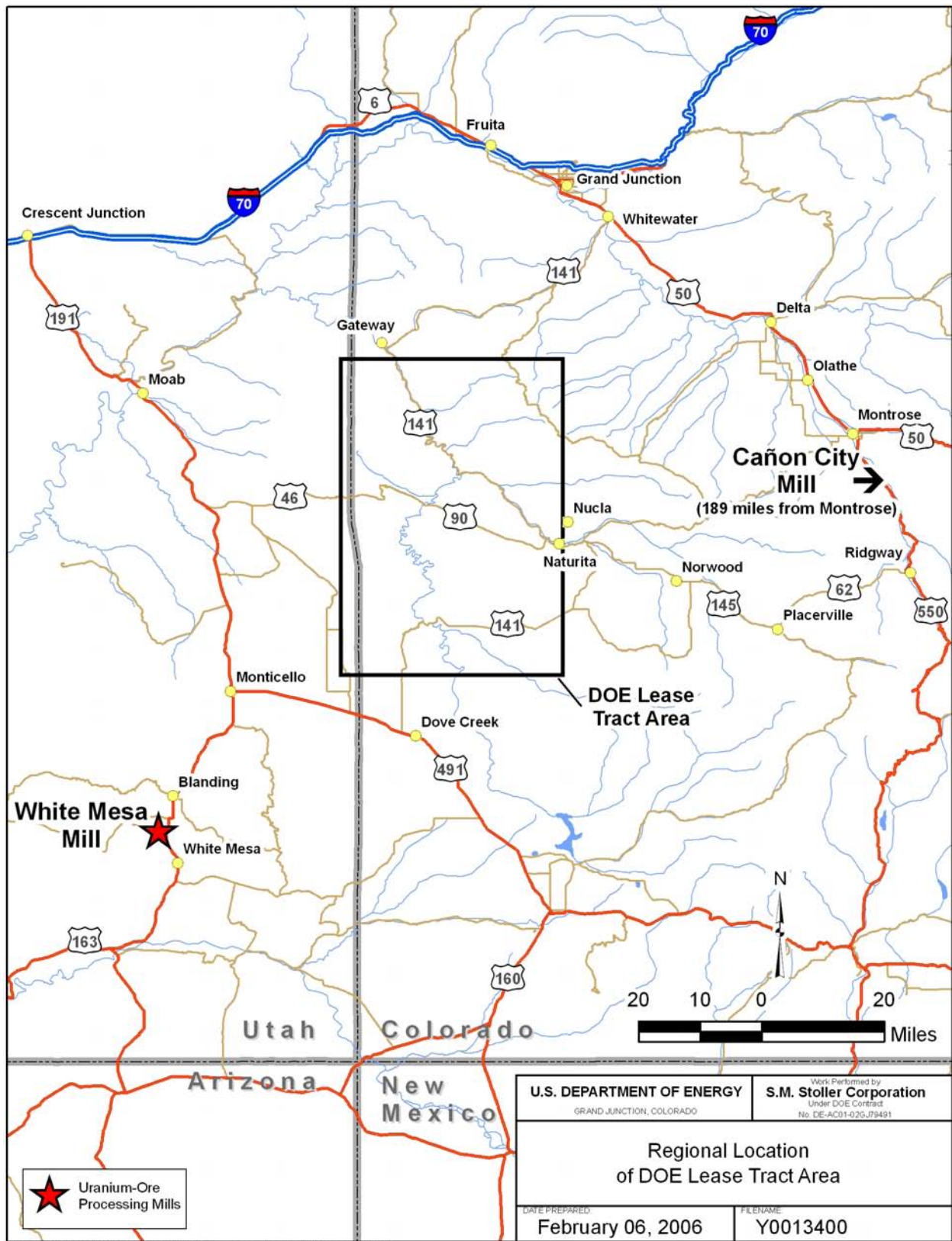


Figure 1–1. Regional Location of DOE Lease Tract Area and Uranium-Ore Processing Mills

### 1.3.2 Scoping Comments

In accordance with DOE and the CEQ NEPA regulations (10 CFR 1021 and 40 CFR 1500–1508), the public and agencies were afforded 30 days (August 1–30, 2005) to comment on the scope of the issues that should be evaluated in this EA. DOE placed advertisements in nine local papers and in other newspapers and sent 70 press releases to federal, state, and local agencies, tribes, elected officials, and libraries. This notification made information available to the readership of potentially affected towns and members of the public near the proposed uranium lease tracts and along all reasonable transportation routes between the lease tracts and the existing ore-processing mill in Cañon City, Colorado, and the White Mesa Mill in Utah, between Blanding and White Mesa. In addition, DOE held two scoping meetings in Naturita, Colorado, and Monticello, Utah, that were attended by 16 people. DOE received comments consisting of phone messages, letters, and e-mails from 15 entities during the scoping period. Commentors spoke both in favor of continuing and expanding the lease program as well as against its continuation or expansion. This section presents an overview of the issues raised in the comments; Appendix A presents a detailed summary of the comments and DOE's responses to each issue raised during scoping.

#### Effects to Human Health

About a third of the comments indicated that effects to human health should be addressed in the EA. Health-related concerns included the following issues:

- An increase in traffic accidents that could result from an increase in truck traffic on the highways.
- Identification of transportation routes used for ore hauling.
- Windblown radioparticulates from the mines.
- Radon emissions.
- Adequate health and safety standards to protect workers and the public from radioactive contamination.
- Increased demand on emergency services.

#### Effects to the Environment

About a third of the comments indicated that ecological and environmental effects should be addressed in the EA. These concerns included the following issues:

- The need for successful reclamation of the lease tracts at the end of operations.
- Visual impact of waste rock excavated from the mines.
- The need for storm water management.
- Control of noxious weeds that may proliferate on disturbed ground.
- The potential for adverse effects to the Dolores River Canyon where lease tracts are near the river.



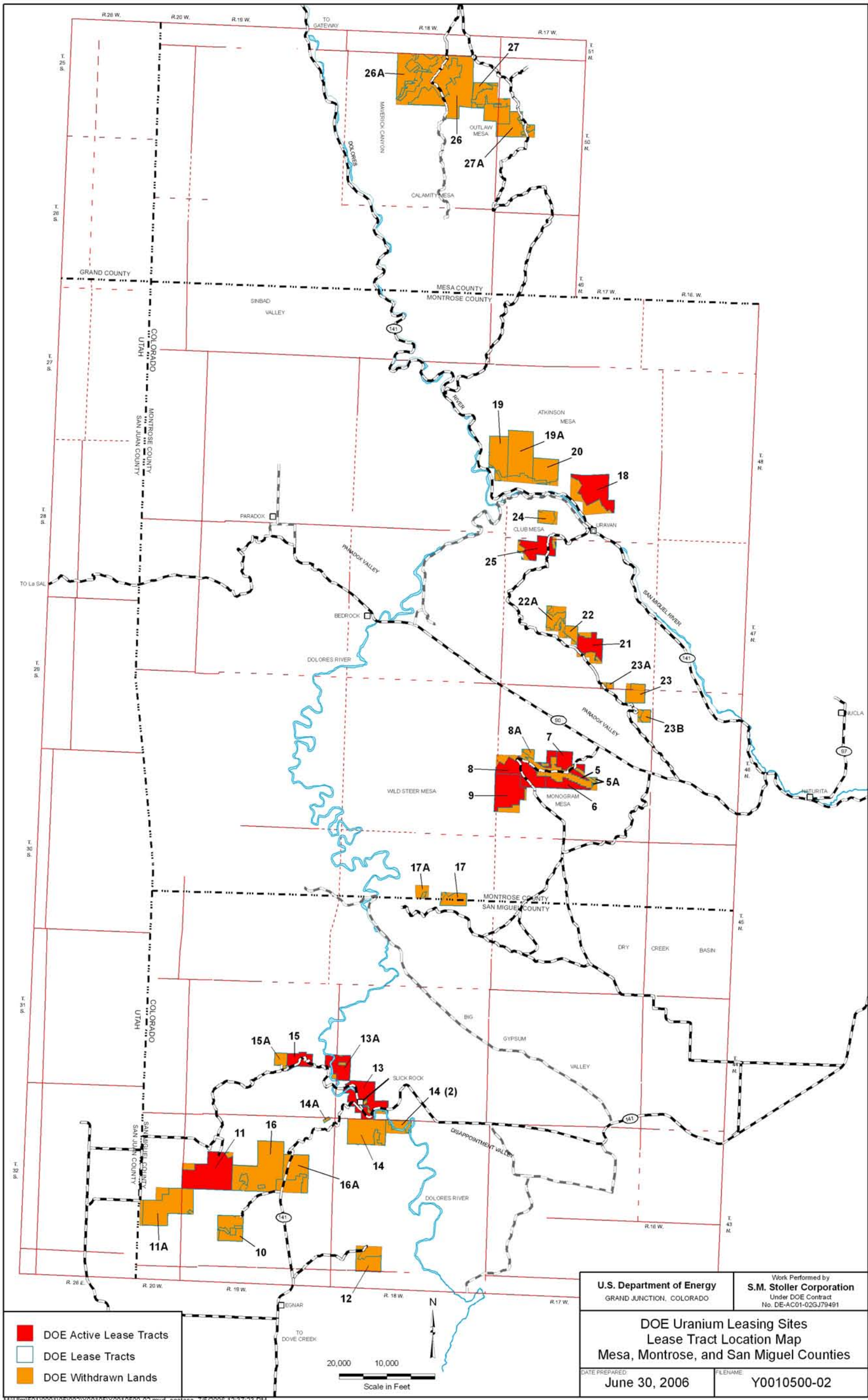


Figure 1-2. DOE Uranium Leasing Program Lease Tracts and Withdrawn Lands

2  
3  
4  
5  
6

## **Economic Effects**

Several commentors asked about the effects of uranium mining and milling on the regional economy, especially in the counties where the mines are located. Some residents of the potentially affected areas have experienced past “boom-and-bust” cycles of the uranium industry and are wary of actions that could cause those conditions to return. The main concerns included the following issues:

- The number of jobs that would be created under the lease program.
- Job security and what the mining industry would give back to the communities.
- Effects on the tax base in affected areas.
- In the past, uranium mining and milling have resulted in added costs to taxpayers for cleanup. The EA should address the costs to taxpayers for cleanup after operations at the lease tracts have finished.

## **Need for an Environmental Impact Statement**

A few commentors felt that an EA was inadequate to address the full scope of the proposed action and that an environmental impact statement should be prepared instead.

## **Public Participation**

Some commentors had concerns that the public would not be given adequate opportunity to comment on the proposed action. Concerns included the following issues:

- The 30-day period provided for comments was not enough time.
- Information about DOE’s proposed action and the public comments should be made available in public libraries.
- All potentially affected parties need to be notified of DOE’s proposed action.

End of current text

## 2.0 Purpose and Need for Action

Consistent with the Energy Policy Act of 2005 (Public Law 109-58), which emphasizes the reestablishment of nuclear power, DOE-LM must evaluate the ULP to determine if it is in the U.S. Government's best interest to continue leasing some or all of DOE's withdrawn lands and government-owned patented claims (referred to as DOE-managed lands) for the exploration and production of uranium and vanadium ores for up to 10 more years. Current leases will expire in January 2007. The Domestic Uranium Program regulation, codified at 10 CFR 760.1, gives DOE the flexibility to continue leasing these lands if the agency determines that it is in the government's best interest to do so. A key element in this determination is the assessment of environmental impacts attributable to lease tract operations and associated activities. Therefore, DOE-LM is preparing this EA to provide such information to decision makers as well as the public.

End of current text

## 3.0 Description of Alternatives

In the preparation of this EA, DOE considered various alternative actions that would support the stated purpose and need, as well as actions that could be initiated if leasing of the DOE-managed lands were terminated. This section presents an overview of the selection process and a description of the alternatives considered.

### 3.1 Elimination of Alternative Actions

The following alternative actions were considered but eliminated:

- Developing and maintaining uranium mines at other domestic geographic locations outside the Uravan Mineral Belt. This alternative was eliminated because DOE only controls the ore reserves of the 38 lease tracts referenced in this EA.
- Transferring the withdrawn lands and lease management responsibilities to BLM. This alternative was eliminated because DOE is the only government agency that has the legislative authority to *lease* lands for the development and production of uranium and vanadium ores and collect royalties based on that production. If, as described under the No Action alternative, DOE's lease tracts were transferred to BLM, they could be subjected to claims under applicable mining laws, which collect fees but do not allow lands to be leased. As a result, the return to the Federal Government would be considerably less.

### 3.2 Expanded Program Alternative—Preferred Alternative

Under the Expanded Program alternative, DOE would continue the existing ULP and expand it as warranted. DOE would extend the 13 existing leases for an additional period of time, likely to be 10 years. DOE would then expand the program to include the competitive offering of up to 25 additional lease tracts to the domestic uranium industry (Tract 2 of lease tract 14 would not be offered for lease). This alternative is DOE's preferred alternative because it is consistent with the Energy Policy Act of 2005 that is supportive of new nuclear power generation. As shown in Table 3-1, DOE would consider expanding the individual lease tracts to encompass all DOE-managed lands (more than 27,000 acres that includes withdrawn lands and government-owned mining claims).

This alternative would allow leaseholders to explore for, develop, and extract uranium and vanadium ore reserves on as many as 38 lease tracts for a 10-year period. Mining activities authorized under this alternative would include conventional surface (small open pit, defined herein as limited to a few acres) and underground mining operations and techniques similar to those previously conducted on the lease tracts. No new, large (defined herein as 10 acres or more) open-pit mining operations or in situ mining operations would be allowed without a detailed site-specific environmental analysis.

Near the end of 10 years, DOE would reevaluate the program to determine if leasing activities should continue. Under this alternative, it is assumed that all 38 lease tracts would be brought into production and that 5 of the 38 lease tracts would have two separate and distinct mining operations. Mining operations are grouped by size into three categories (small, large, and very large). Small mining operations are typical of a small-business, single-shift operation that disturbs less than 10 acres of land, employs a minimal (5- to 8-person) workforce, operates a

Table 3–1. Status of the Lease Tracts Under the Expanded, Existing, and No Action Alternatives

Lease Tract No.	Expanded Program		Existing Program		No Action	
	Existing Leases Extended	New Leases Offered	Existing Leases Extended	Lands Retained but not Leased	Existing Leases Expire, Lands Reclaimed and Restored to Public Domain	Lands Restored to Public Domain
5	X		X		X	
5A		X		X		X
6	X		X		X	
7	X		X		X	
7A	X		X		X	
8	X		X		X	
8A		X		X		X
9	X		X		X	
10		X		X		X
11	X		X		X	
11A		X		X		X
12		X		X		X
13	X		X		X	
13A	X		X		X	
14		X <sup>a</sup>		X		X
14A		X		X		X
15	X		X		X	
15A		X		X		X
16		X		X		X
16A		X		X		X
17		X		X		X
17A		X		X		X
18	X		X		X	
19		X		X		X
19A		X		X		X
20		X		X		X
21	X		X		X	
22		X		X		X
22A		X		X		X
23		X		X		X
23A		X		X		X
23B		X		X		X
24		X		X		X
25	X		X		X	
26		X		X		X
26A		X		X		X
27		X		X		X
27A		X		X		X

<sup>a</sup>Tract 2 of lease tract 14 will not be leased.

single fleet of mining equipment, and produces less than 1,000 tons of ore per month. Large mining operations are generally two-shift operations that disturb 15 acres of land, employ a 10- to 20-person workforce, operate two or three fleets of mining equipment, and produce between

2,000 and 3,000 tons of ore per month. Very large mining operations are defined as two- or three-shift operations that disturb more than 25 acres of land, employ a 25-person or greater workforce, operate five or more fleets of mining equipment, and consistently produce more than 5,000 tons of ore per month. Under this alternative, it is assumed that there would be 20 small mining operations (each operation employing six people and disturbing 10 acres), 20 large mining operations (each operation employing 18 people and disturbing 15 acres), and 3 very large mining operations, including the lease tract 7 open-pit mine (each operation employing 30 people and disturbing 25 acres generally, plus the 200-acre open-pit mine). Accordingly, under this alternative, the leaseholders would be expected to disturb a total of 750 acres and employ up to 570 people for an extended period of time (up to 10 years) before ramping down to a reclamation workforce of approximately 60 people for an additional 2-year period.

### **3.3 Existing Program Alternative**

Under the Existing Program alternative, DOE would continue the ULP as it currently exists. As shown in Table 3–1, DOE would extend the existing 13 leases for an additional period of time, likely to be 10 years. DOE would retain the other 25 lease tracts in inactive status until the program ended, at which time all lands would be restored to the public domain with the concurrence of and under the BLM’s administrative control. Retaining leases in inactive status would make them unavailable for leasing activities or the filing of mining claims. This alternative would allow the current leaseholders to explore for, develop, and extract uranium and vanadium ore reserves on their respective lease tracts for a 10-year period. Mining activities authorized under this alternative would include conventional surface (small open pit) and underground mining operations and techniques similar to those previously conducted on the lease tracts. No new, large, open-pit mining operations or in situ mining operations would be allowed without a detailed site-specific environmental analysis. Near the end of 10 years, DOE would reevaluate the program to determine if leasing activities should continue. Under this alternative, it is assumed that there would be eight small mining operations (each operation employing six people and disturbing 15 acres), six large mining operations (each operation employing 18 people and disturbing 15 acres), and one very large mining operation (the lease tract 7 open-pit mine employing 30 people and disturbing 200 acres). Accordingly, under this alternative, the leaseholders would be expected to disturb a total of 410 acres and employ a workforce of approximately 186 people for an extended period of time (up to 10 years), before ramping down to a reclamation workforce of approximately 60 people for an additional 2-year period.

### **3.4 No Action Alternative**

As shown in Table 3–1, under the No Action alternative, DOE would allow the 13 existing leases to expire by January 2007 as currently scheduled. The leaseholders would be required to reclaim their respective operations. Once final reclamation activities were completed, the ULP would end, and all lands would be restored to the public domain with the concurrence of and under the BLM’s administrative control. Any future mining on these lands would be subjected to the laws and regulations governing such development on BLM lands. Under this alternative, the leaseholders would be expected to employ a reclamation workforce of approximately 60 people for a 2-year period, after which DOE’s leasing program would terminate.



### 3.5 Summary of Potential Activities

Under the Expanded Program and Existing Program alternatives, DOE would enter into long-term Memorandums of Understanding with BLM and the Colorado Division of Minerals and Geology (CDMG), respectively, outlining each agencies' roles and responsibilities associated with ULP. Historically, activities conducted on the lease tracts occurred in three phases: preoperational (exploration), operational (mining), and postoperational (reclamation). Since 1974, preoperational activities have occurred on 37 of the 38 lease tracts, including all 13 active lease tracts. Operational activities have occurred on 25 of the 38 lease tracts, including all 13 active lease tracts. Of the more than 7,000 acres that compose the 13 active lease tracts, approximately 300 acres are currently disturbed or environmentally affected by lease operations. Two-thirds of this disturbed area (approximately 200 acres) is associated with the open-pit mining operations on lease tract 7. Table 3–2 presents summary information for the 38 lease tracts and the current operations being conducted on the 13 active lease tracts.

To resume previously approved activities at the existing mine sites (those not previously reclaimed) on the 13 active lease tracts, leaseholders would be required to notify DOE of their proposed activities. Upon such notification, DOE would review the previously approved plan and the respective approval letter, with reference to existing federal and state requirements and current environmental regulations, to determine if additional stipulations would be required. DOE would notify BLM of the individual leaseholder's proposed activities. An on-site examination would be conducted to assess site-specific conditions and environmental concerns. During the on-site examination, all reviewing parties would be expected to voice any site-specific issues or concerns that arise from the leaseholder's proposed activities. Any concerns that could be mitigated by stipulations to the plans would be identified. On the basis of this review, DOE would authorize the leaseholder to resume operations, with or without additional stipulations as warranted. DOE's approval would be required before any surface-disturbing activities could be conducted. Additional site-specific environmental reviews of a proposed activity may be warranted; those reviews would be required prior to DOE's approval. Typically, unless the leaseholder proposes to enlarge the mine site beyond what was previously approved, no new surveys (for cultural resources and threatened or endangered species) would be required.

To reopen an existing mine that has been reclaimed, leaseholders would be required to submit a mining plan to DOE outlining their proposed activities. Upon receipt of such a plan, DOE would initiate a two-tiered review process of the plan (see Figure 3–1). Under its NEPA procedures, DOE would determine (1) if the proposed activities outlined in the plan would be consistent with the activities outlined and discussed in this EA (no further NEPA review would be required) and (2) if additional NEPA documentation is required and, if so, define those requirements. Concurrently, DOE would initiate a technical review of the plan in accordance with applicable regulations, the lease agreement, and standard industry practices to ensure compliance with all administrative and environmental requirements. A copy of the plan would be forwarded to the applicable BLM Field Office for review. An on-site examination would then be conducted to assess site-specific conditions and environmental concerns. During the on-site examination, all reviewing parties would be expected to voice any site-specific issues or concerns that arise from the leaseholder's proposed activities. Any concerns that could be mitigated by stipulations to the plan would be identified. On the basis of this two-tiered review, DOE would either approve the plan (as submitted or with stipulations) or direct the leaseholder to revise the plan and resubmit it.

1  
2

Table 3–2. Summary of Lease Tract Information

Characteristic	Lease Tract 5	Lease Tract 5A	Lease Tract 6	Lease Tract 7	Lease Tract 7A	Lease Tract 8	Lease Tract 8A	Lease Tract 9	Lease Tract 10	Lease Tract 11	Lease Tract 11A	Lease Tract 12	Lease Tract 13	Lease Tract 13A	Lease Tract 14	Lease Tract 14A	Lease Tract 15	Lease Tract 15A	Lease Tract 16	Lease Tract 16A
Location of Lease Tracts	Secs. 21, 22; T46N, R17W, NMPM	Sec. 22; T46N, R17W, NMPM	Secs. 21, 22; T46N, R17W, NMPM	Secs. 16, 21, 22; T46N, R17W, NMPM	Secs. 16, 20, 21, 22; T46N, R17W, NMPM	Secs. 17, 18, 19, 20; T46N, R17W, NMPM	Sec. 17; T46N, R17W, NMPM	Secs. 19, 29, 30; T46N, R17W, NMPM	Secs. 28, 29; T43N, R19W, NMPM	Secs. 8, 17, 18; T43N, R19W, NMPM	Sec. 19; T43N, R19W, and Secs. 23, 24, 25, 26; T43N, R20W, NMPM	Sec. 32; T43N, R18W, NMPM	Secs. 29, 30, 31, 32, 33; T44N, R18W, NMPM	Secs. 19, 30; T44N, R18W, and Secs. 24, 25; T44N, R19W, NMPM	Secs. 4, 5, 6; T43N, R18W, NMPM	Sec. 1; T43N, R19W, and Sec. 36; T44N, R19W, NMPM	Secs. 23, 26; T44N, R19W, NMPM	Secs. 22, 27; T44N, R19W, NMPM	Secs. 10, 15, 16; T43N, R19W, NMPM	Secs. 11, 14; T43N, R19W, NMPM
County	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel
Lease Tract Status	Active	Inactive	Active	Active	Active	Active	Inactive	Active	Inactive	Active	Inactive	Inactive	Active	Active	Inactive	Inactive	Active	Inactive	Inactive	Inactive
Leaseholder (if Applicable)	Gold Eagle Mining, Inc.	N/A	Cotter Corporation	Cotter Corporation	Cotter Corporation	Cotter Corporation	N/A	Cotter Corporation	N/A	Cotter Corporation	N/A	N/A	Gold Eagle Mining, Inc.	Cotter Corporation	N/A	N/A	Gold Eagle Mining, Inc.	N/A		
Lease Tract Acreage	81	24	325	320	120	813	78	897	528	1258	1304	399	993	393	1099	21	350	171	1567	670
Primary Location of Lease Activities	NE1/4, Sec. 21	Widely spaced drilling	Mine's primary surface facility not on tract (NE 1/4, Sec. 22)	SE1/2, Sec. 16	Widely spaced drilling	Mine's primary surface facility not on tract (NE 1/4, Sec. 20)	N/A	S 1/2, Sec. 30	NW 1/4, Sec. 28 and NE 1/4, Sec. 29	NE 1/4, Sec. 18	Widely spaced drilling	NE 1/4, Sec. 32	SE 1/4, Sec. 30	NE 1/4, Sec. 25	Widely spaced drilling	Widely spaced drilling	SE 1/4, Sec. 23	SE 1/4, Sec. 22	Small operations scattered all within Sec. 16	N 1/2, Sec. 14
Existing Disturbances (acres)	5	0	10	200	0	10	0	10	0	11	0	0	15	5	0	0	0	0	0	0
Historical Lease Activities (type)	Exploration and Mining	Exploration	Exploration and Mining	Exploration and Mining	Exploration	Exploration and Mining	N/A	Exploration and Mining	Exploration and Mining	Exploration and Mining	Exploration	Exploration and Mining	Exploration and Mining	Exploration and Mining	Exploration and Mining	Exploration and Mining	Exploration and Mining	Exploration and Mining	Exploration and Mining	Exploration and Mining
Site Features																				
Legacy Mine Sites (pre 1970)	Reclaimed	No	No	Reclaimed	No	No	No	No	Reclaimed	Reclaimed	Reclaimed	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed
Previous Mine Sites (Post-1974)	Yes	No	Yes	Yes	No	Yes	No	Yes	Reclaimed	Yes	No	Reclaimed	Yes	Reclaimed	No	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed
Buildings/Structures	Yes	No	Yes	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No	No	No	No	No	No
Mine Portals (shafts/adits/declines) and/or Open Pit Mines	Shaft	No	Adit	Large Open Pit Mine and Decline	No	Adit	No	Decline	Reclaimed	Decline	No	Reclaimed	3 Adits and 1 Decline	Reclaimed	No	No	Adit	Reclaimed	Reclaimed	Reclaimed
Ventilation Shafts	3	No	2	1	No	No	No	3	Reclaimed	1	No	Reclaimed	1	Reclaimed	No	No	No	No	No	No
Mine-Waste-Rock Dumps	Yes	No	Yes	Yes	No	Yes	No	Yes	Reclaimed	Yes	No	Reclaimed	Yes	Reclaimed	No	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed
Exploration Drill Roads	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exploration Drill Holes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Petroleum Storage Tanks	Yes	No	Yes	Yes	No	Yes	No	Yes	No	Yes	No	No	No	No	No	No	No	No	No	No
Mine-Water Treatment Systems	No	No	No	Yes	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Comments	Mine on standby status		Mine is in active production	Underground mine is being developed	Tract used to support lease tract 7 open pit mine	Mine is in active production		Mine is in active production		Mine is being developed			Mines are on standby status				Mine on standby status			

3 Adit—A nearly horizontal passageway leading into a mine.  
4 Incline/Decline—A mine passageway that slopes upward or downward at an angle from the horizontal.  
5 Shaft—A near-vertical passageway leading from ground surface into a mine.  
6

1  
2

Table 3–2 (continued). Summary of Lease Tract Information

Characteristic	Lease Tract 17	Lease Tract 17A	Lease Tract 18	Lease Tract 19	Lease Tract 19A	Lease Tract 20	Lease Tract 21	Lease Tract 22	Lease Tract 22A	Lease Tract 23	Lease Tract 23A	Lease Tract 23B	Lease Tract 24	Lease Tract 25	Lease Tract 26	Lease Tract 26A	Lease Tract 27	Lease Tract 27A
Location of Lease Tracts	Sec. 14; T45N, R18W, NMPM	Sec. 15; T45N, R18W, NMPM	Secs. 21, 22, 26, 27, 28; T48N, R17W, NMPM	Secs. 13, 24; T48N, R18W, NMPM	Secs. 18, 19; T48N, R17W, NMPM	Sec. 20; T48N, R17W, NMPM	Secs. 22, 27; T47N, R17W, NMPM	Secs. 21, 28; T47N, R17W, NMPM	Secs. 16, 17, 20, 21; T47N, R17W, NMPM	Sec. 1; T46N, R17W, and Sec. 36; T47N, R17W, NMPM	Sec. 35; T47N, R17W, NMPM	Secs. 1, 12; T46N, R17W, NMPM	Sec. 32; T48N, R17W, NMPM	Secs. 5, 6; T47N, R17W, NMPM	Secs. 2, 3, 9, 10, 11, 14; T50N, R18W, NMPM	Secs. 3, 4, 9; T50N, R18W, NMPM	Secs. 7, 18; T50N, R17W, and Secs. 12, 13; T50N, R18W, NMPM	Secs. 17, 18; T50N, R17W, NMPM
County	Montrose/ San Miguel	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Mesa	Mesa	Mesa	Mesa
Lease Tract Status	Inactive	Inactive	Active	Inactive	Inactive	Inactive	Active	Inactive	Inactive	Inactive	Inactive	Inactive	Inactive	Active	Inactive	Inactive	Inactive	Inactive
Leaseholder (if Applicable)			Cotter Corporation	N/A	N/A	N/A	Cotter Corporation	N/A	N/A	N/A	N/A	N/A	N/A	Cotter Corporation	N/A	N/A	N/A	N/A
Lease Tract Acreage	283	21	916	702	1145	579	443	168	226	339	47	116	201	573	1682	937	676	524
Primary Location of Lease Activities	Widely spaced drilling	Widely spaced drilling	Mine's primary surface facility not on tract (SW 1/4, Sec 27)	SE 1/4, Sec. 24	Widely spaced drilling	Widely spaced drilling	SW 1/4, Sec. 27	SW 1/4, Sec. 21	NW 1/4, Sec. 21	NE 1/4, Sec. 1	Widely spaced drilling	NE 1/4, Sec. 12	Widely spaced drilling	Mine's primary surface facility not on tract (NW 1/4, Sec. 4)	SW 1/4, Sec. 11 and NW 1/4, Sec. 14	NE 1/4, Sec. 9	SE 1/4, Sec. 12 and NE 1/4, Sec. 13	Widely spaced drilling
Existing Disturbances (Acres)	0	0	15	0	0	0	14	0	0	0	0	0	0	0	5	0	0	0
Historical Lease Activities (Type)	Exploration	Exploration	Exploration and mining	Exploration and mining	Exploration	Exploration	Exploration and mining	Exploration and mining	Exploration and mining	Exploration and mining	Exploration	Exploration and mining	Exploration	Exploration and mining	Exploration and mining	Exploration and mining	Exploration and mining	Exploration and mining
Site Features																		
Legacy Mine Sites (Pre-1970)	No	No	No	Reclaimed	No	No	Yes	No	Reclaimed	No	No	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed
Previous Mine Sites (Post-1974)	No	No	Yes	Reclaimed	No	No	Yes	Reclaimed	Reclaimed	Reclaimed	No	Reclaimed	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed	No
Buildings/Structures	No	No	Yes	Head frame	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No
Mine Portals (Shafts/Adits/ Declines) and/or Open Pit Mines	No	No	Adit	Reclaimed	No	No	Decline	Reclaimed	Reclaimed	Reclaimed	No	Reclaimed	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed
Ventilation Shafts	No	No	1	Reclaimed	No	No	Yes	Reclaimed	Reclaimed	No	No	No	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed	No
Mine-Waste-Rock Dumps	No	No	Yes	Reclaimed	No	No	4	Reclaimed	Reclaimed	Reclaimed	No	Reclaimed	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed
Exploration Drill Roads	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exploration Drill Holes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Petroleum Storage Tanks	No	No	Yes	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No
Mine-Water Treatment Systems	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Comments			Mine is in active production				Mine is being developed											

3  
4  
5  
6

Adit—A nearly horizontal passageway leading into a mine.  
Incline/Decline—A mine passageway that slopes upward or downward at an angle from the horizontal.  
Shaft—A near-vertical passageway leading from ground surface into a mine.

## Leaseholder Plan Review and Approval Process

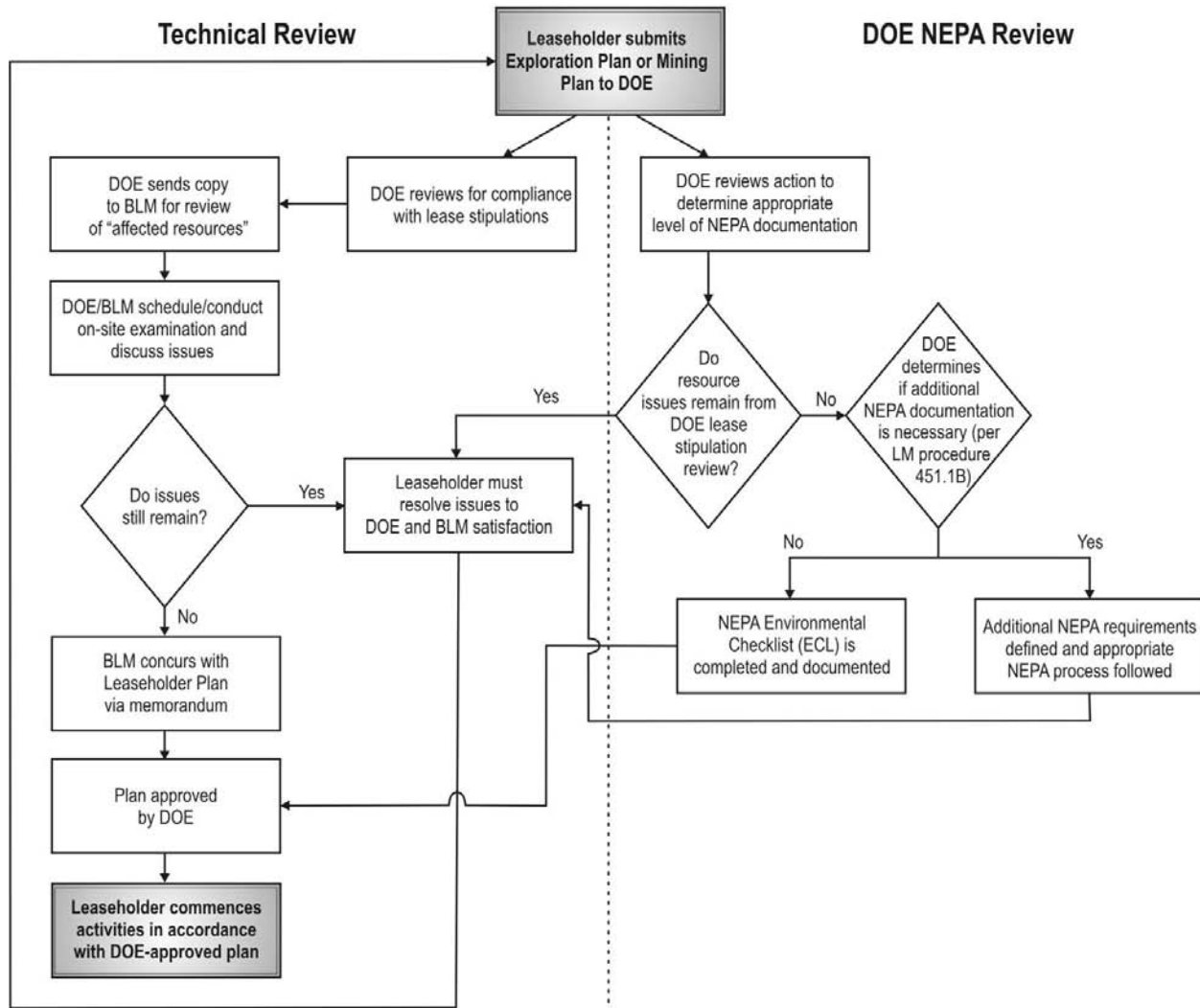


Figure 3–1. Leaseholder Plan Review and Approval Process

DOE's approval would be required before any surface-disturbing activities could be conducted. Additional site-specific environmental reviews of a proposed activity might be warranted; those reviews would be required prior to DOE's approval.

For all new activities, leaseholders would be required to submit plans (mining and/or exploration) to DOE outlining their proposed activities. Upon receipt of the plan, DOE would initiate a two-tiered review process as described above. Under its NEPA procedures DOE would determine (1) if the proposed activities outlined in the plan would be consistent with the activities outlined and discussed in this EA (no further NEPA review would be required) and (2) if additional NEPA documentation is required and, if so, define those requirements. Concurrently, DOE would initiate a technical review of the plan in accordance with applicable regulations, the lease agreement, and standard industry practices to ensure compliance with all administrative and environmental requirements. A copy of the plan would be forwarded to the applicable BLM Field Office for review. An on-site examination would then be conducted to

1 assess site-specific conditions and environmental concerns. During the on-site examination, all  
2 reviewing parties would be expected to voice any site-specific issues or concerns that arise from  
3 the leaseholder's proposed activities. Any concerns that could be mitigated by stipulations to the  
4 plan would be identified. On the basis of this two-tiered review, DOE would either approve the  
5 plan (as submitted or with stipulations) or direct the leaseholder to revise the plan and resubmit  
6 it. DOE's approval would be required before any surface-disturbing activities could be  
7 conducted. Additional site-specific environmental reviews of a proposed activity might be  
8 warranted; those reviews would be required prior to DOE's approval.

9  
10 New surface disturbances would also require review or approval by agencies outside DOE. The  
11 following are examples of situations that would require outside-agency review or approval.  
12 DOE's approval of the proposed plan would be contingent upon the leaseholder's compliance  
13 with the requirements of these other reviewing agencies.

- 14 • For all proposed activities where new surface disturbance would occur, the leaseholder  
15 would be required to obtain an appropriate permit from the CDMG in accordance with the  
16 *Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board*  
17 (CDNR 1995). The nature of the permit would depend on the proposed activities. During  
18 this permit process, local governments and agencies would have the opportunity to review  
19 the proposed activities and implement their requirements. Additionally, the general public  
20 would have the opportunity to renew and comment on the proposed activities and the  
21 associated permit.
- 22 • For all proposed surface disturbances, the leaseholder would be required to consult with the  
23 Colorado Division of Wildlife (CDOW), U.S. Fish and Wildlife Service (USFWS), and/or  
24 BLM, as appropriate, to determine whether threatened or endangered, sensitive, or special  
25 status plant and wildlife species could occur in the area, or whether the agencies might have  
26 other plant or wildlife concerns in the area. The leaseholder might be required to provide  
27 surveys or additional documentation regarding the vegetation or wildlife of concern. DOE  
28 would not approve the proposed plan until all agency concerns were resolved.
- 29 • For all new proposed surface disturbances, the leaseholder would be required to perform a  
30 cultural and historic resource inventory of the area to be disturbed. Such inventories would  
31 be documented in accordance with the State Historic Preservation Office's (SHPO's)  
32 Class III inventory standards and provided to DOE and BLM. If cultural or historic  
33 resources were identified in the area, BLM, DOE, and SHPO would consult to determine if  
34 the resource was eligible for inclusion in the National Register of Historic Places. As the  
35 surface managing agency, BLM would be the lead agency for this consultation  
36 (BLM 1980). If the leaseholder's proposed activities were expected to adversely affect an  
37 eligible cultural or historic resource, DOE, BLM, and SHPO would negotiate a mitigation  
38 plan that the leaseholder would be required to implement. Surface disturbance would not be  
39 allowed until the mitigation plan was agreed upon and implemented.
- 40 • For proposed activities on lease tracts 17 and 17A, DOE would contact BLM to review the  
41 proposed activities to ensure that the Dolores River Canyon Wilderness Study Area would  
42 not be adversely affected. If appropriate, mitigation measures would be applied to the  
43 activity.
- 44 • For disturbances proposed in potential floodplain or wetland areas, the leaseholder would  
45 be required to determine, through consultation with the U.S. Army Corps of Engineers  
46 (USACE), U.S. Environmental Protection Agency (EPA), USFWS, and the appropriate

1 state agency, whether a jurisdictional floodplain or wetland was present. The leaseholder  
2 might need to propose mitigation measures in a Floodplain or Wetland Assessment. DOE  
3 would review the proposed activity in accordance with 10 CFR 1022 and would approve or  
4 disapprove surface disturbance in consultation with USACE, EPA, and the appropriate state  
5 agency.

6  
7 Under the Expanded Program alternative, such  
8 disturbances are expected to affect an additional  
9 450 acres of previously undisturbed land; under  
10 the Existing Program alternative, new surface  
11 disturbances associated with the three phases of  
12 operations are expected to affect an additional  
13 110 acres. Approximately 50 percent of this new  
14 disturbance would be associated with the  
15 placement of mine-waste-rock piles. Other new  
16 disturbances would be associated with roads, drill  
17 pads, small surface mines that consist of less than  
18 5 acres, mine portals, or other surface-plant  
19 support facilities.

20  
21 During the three phases of operations, the  
22 leaseholder, in accordance with the lease  
23 agreement, would be required to protect the health  
24 and safety of mine workers through  
25 implementation of Mine Safety and Health  
26 Administration (MSHA) rules and regulations  
27 (codified at 30 CFR 57.5038, 57.5039, and  
28 57.5047), which address protection of the worker  
29 from physical safety and radiological hazards. The  
30 leaseholder would be required to ensure that mine  
31 workers would not receive an exposure to radon  
32 daughters of more than 4 working-level months in  
34 any calendar year and that they would not be  
36 exposed to air containing concentrations of radon  
38 daughters exceeding 1.0 working level. In  
40 addition, the leaseholder would be required to  
42 ensure that a worker's individual exposure to  
44 gamma radiation would not exceed 5 rem per  
46 year. During transport of ore, the leaseholder  
48 would be required to ensure that haul-truck  
50 drivers' exposure to radiation would not exceed  
52 MSHA or U.S. Department of Transportation  
54 (DOT) (49 CFR 173.425[c][3] and 173.441[b]4)  
56 standards, as applicable.

58  
60 The leaseholder, in accordance with the lease  
62 agreement, would be required to protect members  
64 of the public from radiation by complying with

**Exposure** is the total quantity of radiation at a given point measured in air. It is also a measure of gamma or X radiation at a certain location, based on the location's ability to produce ionization in air. The unit of exposure for gamma and X radiation is the roentgen.

**Gamma radiation** is short wavelength electromagnetic radiation originating in the nucleus of an atom; similar to x-rays but of higher energy.

A **mine-waste-rock pile** is a topographic feature associated with mining operations that contains host rock and naturally occurring radioactive material and usually is not cost effective to process further.

A **working level** is any combination of short-lived radon daughters in 1 liter of air that results in the ultimate emission of  $1.3 \times 10^5$  million electron volts of potential alpha particle energy.

A **working level month** is an exposure to 1 working level for 170 hours.

A **rem** (derived from roentgen equivalent man) is a dose of radiation that will cause the same biological effect as 1 roentgen of gamma ray exposure.

**Effective dose equivalent** is the sum of the products of absorbed dose and appropriate factors that account for differences in biological tissue damage produced by different kinds of ionizing radiation and its distribution in the body. The unit of effective dose equivalent is the rem.

**Total effective dose equivalent** is the sum of the deep-dose equivalent (for external exposure) and the committed effective dose equivalent (for internal exposure).

A **member of the public** is an individual in a controlled or unrestricted area on the lease tracts. The individual would not be involved in mining operations but could be a receiver of radiation doses. Any individual receiving an occupational dose would not be considered a member of the public.

radiation standards established by the U.S. Nuclear Regulatory Commission (NRC) and EPA. NRC's standard for total effective dose equivalent is 100 millirems per year (mrem/yr) (10 CFR 20). The EPA standard states that "emissions of radon-222 to the ambient air from an underground uranium mine shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/y" (40 CFR 61.22).

The following subsections describe the lease activities that could occur during the preoperational, operational, and postoperational phases. Depending on the lease-specific operations, a leaseholder could conduct each phase individually or conduct all three phases simultaneously.

### **3.5.1 Preoperational Activities**

Activities that occur before mine development and ore extraction are considered preoperational activities and are grouped into two categories: surface exploration and mine-site preparation. Activities in both categories would be primarily short term and could be conducted concurrently. Surface exploration activities would include planning, obtaining access to the lease tracts, constructing roads (if required), performing exploratory drilling, and conducting other types of prospecting activities. Mine-site preparation activities would include planning, building, and improving surface-plant areas.

#### **3.5.1.1 Surface Exploration**

Before surface-disturbing activities related to exploration could be conducted, an Exploration Plan must be submitted to DOE for approval and a Notice of Intent (NOI) for prospecting must be submitted to and approved by CDMG.

The Exploration Plan would provide descriptions of

- The areas to be explored, accompanied by maps and/or aerial photos designating existing and proposed access roads.
- The proposed exploration methods.
- Measures to be taken to ensure compliance with NEPA or other environmental requirements.
- The activities required to reclaim the drill site and associated environmental disturbances.

DOE would review the proposed activities outlined in the Exploration Plan to ensure compliance with DOE NEPA regulations, other environmental regulations, and the lease agreement. In addition to submitting the Exploration Plan to DOE, the leaseholder would submit a NOI for prospecting to CDMG for review and approval.

Before transporting drilling equipment to the lease tracts, the leaseholder would be required to obtain authorization for access to the lease tracts. BLM typically would administer off-lease access; DOE would administer on-lease access. Both agencies would require that existing roads be used whenever possible. If existing access were unavailable or unsuitable, road construction might be necessary. The leaseholder would consult with either DOE or BLM, depending on whether on-lease or off-lease access was necessary, to ensure that natural resource concerns and sensitive environmental areas were identified in areas of potential disturbance. The leaseholder

also would be required to consult with appropriate state agencies (e.g., CDOW or SHPO) for natural resource and cultural resource concerns. Rights-of-way (ROWs) stipulations would require the leaseholder to mitigate adverse impacts to the environment. During the period of road use, the leaseholder would be obligated to preserve the integrity of previous improvements (e.g., fences, gates, cattle guards, trails, bridges, and water control structures) and to avoid public-land survey monuments. The leaseholder would be required to restore damaged items to their previous condition.

Exploration roads usually would be temporary and generally would be less than 20 feet (ft) in width. Surface disturbance would be limited to the minimum area required to obtain a grade and condition that would provide for the safe transportation of drilling equipment to drilling locations. In most cases, disturbance would include removing vegetation and leveling high points in the ROWs. Excavated surface soil material or subsoil should be stockpiled for future reclamation. Borrow ditches, crowning, water bars, culverts, side-slope stabilization measures, and riprap would be used to control erosion.

Once access to a drilling location was established, a site approximately 15 by 50 ft would be leveled to allow the drill rig to operate. Clearing would be accomplished with as little surface disturbance as possible. Excavation would be required only on extremely uneven terrain, and surface soil material would be stockpiled for future reclamation.

Typically, rotary drill rigs would be used to drill exploratory holes (approximately 6 inches in diameter) to as deep as 700 ft. The Salt Wash Member of the Morrison Formation would be the primary target horizon. Where the target horizon is shallow (less than 200 ft), smaller drill rigs such as track- or truck-mounted wagon drills might be used. Leaseholders would be required to comply with state requirements during the drilling and abandonment of exploratory holes. These requirements, outlined in *Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board* (CDNR 1995), include procedures for protecting ground water, avoiding cross contamination between aquifers, and abandoning drill holes.

During drilling operations, the leaseholder would be required to take measures to protect natural resources. Drill sites typically would be secured from the public and inadvertent intrusion by wildlife. The leaseholder would be required to equip bulldozers, drill rigs, and other site machinery with fire-suppression equipment and would be required to participate in fire-suppression efforts when feasible.

At the cessation of exploration, access roads and drill pads would be reclaimed unless DOE or BLM, as appropriate, directed otherwise. Reclamation would require recontouring the land to the original grade (or to a condition acceptable to the managing agency), replacing surface soil material, reseeding the disturbed areas with an approved seed mix, and employing erosion control methods.

#### 3.5.1.2 Mine-Site Preparation

When suitable ore reserves have been located, the leaseholder would develop a Mining Plan and submit it to DOE for approval.



1 The Mining Plan would provide

- 2 • Detailed descriptions of roads (including existing and proposed roads), ore reserves, and  
3 areas to be affected.
- 4 • Maps or aerial photos showing the location of the proposed operations.
- 5 • Detailed descriptions of surface-plant (buildings) areas, mine entries, and operating  
6 methods and procedures.
- 7 • Detailed descriptions of measures and actions to be taken to comply with NEPA or other  
8 environmental regulations and to minimize adverse impacts to the environment.
- 9 • An estimate of the quantity of water required for conducting mine operations and the  
10 location of usable water sources.
- 11 • Detailed descriptions of the activities required to reclaim the mine site and the associated  
12 environmental disturbances.

13  
14 DOE would review proposed activities outlined in the Mining Plan to ensure compliance with  
15 DOE NEPA regulations, other environmental regulations, and the lease agreement. DOE would  
16 have to approve the plan prior to conducting any surface-disturbing activities related to mine-site  
17 preparation. In addition to submitting the Mining Plan to DOE, the leaseholder would be  
18 required to obtain a permit for the proposed operation through the Colorado Mined Land  
19 Reclamation Board.

20  
21 Off-lease land use is necessary to support mine operations. Off-lease activities would require  
22 prior authorization from BLM or the appropriate state agency. ROWs for haul roads and utilities  
23 (i.e., power and communications) would be common off-lease disturbances. Unlike exploration  
24 roads, ROWs used for mine operations usually would be improved to enable long-term use.  
25 ROWs granted by BLM (or the appropriate state agency) usually would be nonexclusive and  
26 would be used by recreationists, grazing permittees, and oil and gas lessees. The leaseholder's  
27 off-lease activities would be stipulated to avoid conflict with other public-land uses; the  
28 leaseholder would be required to comply with state and federal regulations to protect off-lease  
29 and natural resource values. Off-lease activities would be subject to BLM's NEPA process, and  
30 impacts would be mitigated by site-specific stipulations that would be included in the  
31 authorization.

32  
33 Mine-site improvements would be constructed in accordance with federal, state, and local  
34 regulations; construction activities would be accomplished in accordance with MSHA rules and  
35 regulations. Surface-plant area improvements might include

- 36 • Buildings for offices and equipment maintenance.
- 37 • Telephone and power lines.
- 38 • Compressors and compressed air lines.
- 39 • Potable water supply and sanitary facilities (sinks, toilets, and showers).
- 40 • Fuel storage areas.
- 41 • On-site domestic sewage system.
- 42 • Trucks and heavy earth-moving equipment.

- Electric generator.
- Mining equipment (including rock drilling and mine dewatering equipment).
- Explosives storage area.
- Ventilation shafts and fans.
- Residential housing for security and staff.
- Emergency response equipment (for staff safety, environmental damage, and spills).
- Ore stockpiles and loading areas.
- Mine-waste-rock piles (rock removed from mine to access ore).
- Dewatering evaporation ponds and treatment facilities.
- Surface soil material stockpile areas.
- Vegetation test plots.
- Parking lots.

Certain improvements and activities would require specific actions on behalf of the leaseholder before operations could begin. Specific actions could include, but are not limited to,

- Obtaining building permits for utilities, residential structures, offices, and maintenance sheds. Structures and utilities supporting mine operations (e.g., compressors and electrical equipment) would have to meet local and county building codes and ordinances.
- Completing a water development plan for development of a potable water supply. A state well-development permit might be required unless water was obtained from another source, such as a nearby municipal supply. Mine operations would not affect adjudicated water rights.
- Obtaining a county-approved septic permit for installation of a sewage system. If a site were unsuitable for a septic system, portable sewage facilities would be required.
- Obtaining federal or state pollution discharge permits for the control of storm water; development of dewatering and evaporation ponds; and discharge of water from ponds to on-site depressions, valleys, or intermittent streambeds.
- Obtaining state permits that might be required for mine emissions to the atmosphere.
- Responding to special or conditional use permits.
- Developing a plan for gas and diesel fuel storage in accordance with state and local regulations. This plan would include a Spill Prevention Control Plan, as required by federal and state water laws.
- Developing contingency plans for emergencies and releases of hazardous chemicals, substances, pollutants, and wastes.
- Applying fertilizers in accordance with state regulations.

### **3.5.2 Operational Activities**

At the conclusion of preoperational activities, operational activities might be initiated. The aforementioned Mining Plan, submitted to DOE for review and approval, would also describe

these proposed activities in detail. Operational activities may be grouped into two major categories: (1) surface-plant area construction and operation and (2) mine development and operation.

#### 3.5.2.1 Surface-Plant Area Construction and Operation

Leaseholders would construct surface-plant areas to support mining operations. These areas might range in size from 1 to 25 acres but would average less than 10 acres per mine. Surface-plant areas would include the improvements identified in subsection 3.5.1.2, "Mine-Site Preparation," and the improvements described in this subsection.

##### ***Buildings/Utilities***

Buildings constructed on site might vary from offices to maintenance shops and storage sheds. These buildings would be constructed in accordance with federal and state regulations and county ordinances.

The types of utilities required to service these buildings would depend on the types of operations that would be conducted. Electricity to operate mining equipment, mine lighting, and ventilation fans generally would be supplied through aboveground lines. Generators also might supply electricity to the mines. Air would be supplied to the mines by compressors and delivered through lines of various diameters. Water generally would be hauled to the mine site by truck. Sewage and wastewater would be disposed of through a septic system or at a portable facility.

##### ***Service Area***

The service area would be used to service mining vehicles, bulldozers, other heavy equipment, and water trucks. Fuel storage tanks, water tanks, and 55-gallon oil barrels would be located in this area. Leaseholders routinely would conduct inspections of hoses, fuel lines, connections, tank exteriors, and equipment parts stored in the area. Berms and secondary containment for gasoline, solvent, and oil storage facilities would be installed and maintained in accordance with local, state, and federal regulations. If a petroleum spill or leak requiring notification of federal and/or state agencies were to occur, the leaseholder would be required to implement the Spill Prevention Control Plan (including containment and cleanup).

##### ***Storage***

Chemicals, materials, solvents, oils, degreasers, and other substances used to maintain vehicles would be stored and disposed of in accordance with local, state, and federal hazardous substance regulations. Material Safety Data Sheets and emergency equipment (e.g., showers) would be maintained as required by MSHA. If required under federal or state law, a Contingency Plan would be submitted to the State, EPA, and DOE before the actual storage of such materials on site. The Contingency Plan would outline the types of stored materials for which spills would be reported. Some emergency equipment (e.g., first aid supplies, liquid spill-response supplies, and fire extinguishers) would be maintained on site for accidents involving injuries to employees and/or minimal environmental damages. Additional emergency equipment (e.g., mine rescue equipment) would be maintained on site or at centralized locations that would allow for reasonable response times in accordance with MSHA requirements.

1 On-site storage of petroleum products and subsequent disposal would comply with state and  
2 local regulations. A Spill Prevention Control Plan would be prepared in accordance with federal  
3 and state water laws. Explosives would be stored in accordance with state and federal regulations  
4 and away from areas that contain volatile substances.  
5

### 6 ***Security of Potential Safety Hazard Areas***

7

8 Leaseholders would be required to secure and post areas that might be considered hazardous  
9 (e.g., ore stockpile areas, loading areas, mine openings, and mine-waste-rock piles) in  
10 accordance with federal and state regulations. If required by the CDMG permit, the leaseholder  
11 would construct fences and other barriers around safety hazard areas to minimize the potential  
12 for intrusion by humans and wildlife and to reduce exposure to radioactive materials.  
13

### 14 ***Mine-Water Discharge/Treatment Ponds***

15

16 The leaseholder might need to construct mine-water discharge/treatment ponds to receive  
17 discharge water from underground and open-pit mines. The leaseholder would consult with  
18 USFWS to address any concerns that the agency might have. Such ponds would then be  
19 constructed in accordance with applicable regulations. Those regulations might require that the  
20 ponds be adequately lined, fenced, and possibly netted to ensure that wildlife and livestock and  
21 the environment are not adversely affected. Water would be pumped into discharge ponds from  
22 mine sumps constructed in water accumulation areas. If necessary, mine water would be treated  
23 to meet applicable discharge standards (e.g., treated with a barium chloride flocculent, passed  
24 through a manganese dioxide filter, or treated by another suitable method). Water would then  
25 flow to a settling pond, where it would be evaporated or discharged to the environment in  
26 accordance with a state water discharge permit and National Pollutant Discharge Elimination  
27 System requirements. The location of the discharge point would be described to the Colorado  
28 Department of Public Health and Environment (CDPHE) Water Quality Control Division, which  
29 is charged with permit issuance and enforcement. Maintenance of ponds would include replacing  
30 the liners or, if required, reclaiming the ponds after removing the precipitated sediments and  
31 liners. Sediments and liners would be disposed of at a state-approved disposal site. Pond  
32 inspection would be conducted by CDPHE as part of its review of a leaseholder's discharge  
33 permit.  
34

### 35 ***Mine-Waste-Rock Piles***

36

37 Both underground and open-pit mining operations would require removal of barren and low-  
38 grade rock materials to allow access to the economical ore deposits. The removal process would  
39 result in large piles of mine-waste-rock. These mine-waste-rock materials would likely contain  
40 limited quantities of miscellaneous mining-related debris (small remnants of mine timbers or  
41 wood lagging, drill steels, vent bags, etc.) that would be so intermingled with the mine-waste-  
42 rock materials removed from the mine that it would be impractical to separate them.  
43 Accordingly, the leaseholder would be allowed to co-dispose these materials in a mine-waste-  
44 rock pile. The mine-waste-rock piles would contain large fractions of coarse rock, much of  
45 which would be excavated from areas of little or no ore-grade mineralization. Consequently, the  
46 concentrations of radium and uranium in mine-waste-rock would be much lower than their  
47 concentrations in ore. Rainwater percolating through the coarse rock would not leach significant  
48 amounts of radium or uranium because of the low liquid-to-solid ratio. DOE would require

leaseholders to construct diversion channels and berms around the mine-waste-rock piles to prevent storm-water runoff from entering or leaving the piles.

#### ***Non-hazardous Waste***

Mining operations generate various types of non-hazardous waste including empty 55-gallon petroleum barrels, timbers, domestic trash, old mining equipment, and other mining debris. DOE would direct the leaseholder to dispose of these waste materials off site at a proper disposal facility and in accordance with local, state, and federal requirements. Waste generated prior to 1974 would be managed as agreed to by DOE and the leaseholder under the terms of future lease agreements. In cases where waste might have archaeological or cultural significance, SHPO would be consulted.

#### ***Hazardous Waste***

If hazardous waste were generated during construction and operation, the leaseholder would be required to manage (store and dispose of) the waste in accordance with applicable state and federal regulations. No disposal of hazardous waste would be allowed on the lease tracts.

#### **3.5.2.2 Mine Development and Operation**

Uranium and vanadium ores would be recovered by either underground or open-pit mining methods. Activities common to both mining methods would include accessing the ore deposits, controlling possible pollutants, conducting mine maintenance, hauling ore and waste rock, and transporting ore to mills for processing.

At underground mines, rubber-tired (trackless) equipment would typically be used to transport ore and mine-waste-rock from the mine workings (stopes and drifts) to the aboveground ore storage and mine-waste-rock pile areas through adits (almost horizontal mine entrances) or inclines/declines. In some instances, ore and mine-waste-rock would be transported by similar means to the ore skip and hoisted to the surface through the main production shafts. At open-pit mines, overburden consisting of mudstone, shale, and sandstone would be removed first to expose the ore deposit. This mine-waste-rock would be removed with conventional heavy equipment (e.g., backhoes, front-end loaders, scrapers, bulldozers, and haul trucks). Similar equipment would be used to remove the ore.

Contaminants from mining operations that could be discharged inadvertently to an underground or surface water source would be controlled to minimize the potential for their release. Only three lease tracts (13, 13A, and 14) are located near perennial water sources (the Dolores River), and only one of those lease tracts (13) has existing mining activities close to the river. Diversion dams, berms, water bars, silt dams, dikes, and mine-waste-rock pile covers would be constructed to divert surface runoff from active areas of mine operations. Historically, water seepage into mine workings has been minor and would be expected to remain minor; however, a few mines (both underground and open pit) might require the leaseholder to pump water into treatment ponds. Methods of controlling water from these mines were identified previously in the Mine-Water Discharge/Treatment Ponds discussion of this subsection. Limited rainfall throughout this region would have minimal potential to transport contaminants into water sources.

1 Materials used to support mining activities could include bulk explosives, dynamite, and  
2 ammonium nitrate. These materials would be stored in approved areas within the underground  
3 mine or in an approved shed or building on the surface.  
4

### 5 *Underground Mines*

6  
7 As an underground mine is developed and mined, the safety of mine workers and protection of  
8 the environment would be of primary concerns. The leaseholder would be required to routinely  
9 monitor the mine for air quality and noise level. If the air quality were inadequate to ensure the  
10 safety of workers, ventilation shafts to the surface or other ventilation systems would be  
11 constructed. To protect workers from cave-ins, mine walls, backs (ceilings), and other surfaces  
12 would be braced with steel or timber sets and other cribbing materials.  
13

14 Only authorized individuals would be allowed to enter mines. Mine entrances would be secured  
15 during periods of temporary shutdown and during periods of daily inactivity. The public and  
16 wildlife would be discouraged from entry by means of fences, gates, posting, and other barriers.  
17

18 Mining typically would be accomplished by a random room-and-pillar method, which involves  
19 leaving random pillars of ore and waste-rock in place to support the backs and removing ore  
20 material. Two different techniques could be used to mine the ore: the conventional  
21 drill/blast/muck technique (“muck” refers to the loading and removal of ore or mine-waste-rock  
22 from a mine) and the continuous-miner technique.  
23

24 The conventional technique might include the use of jackleg drills or similar devices to drill  
25 2-inch diameter, 6- to 10-ft-deep holes in the rock face. The holes would then be filled with  
26 explosives, and the explosives would be detonated. The broken material would be removed with  
27 shuttle equipment such as load/haul/dumps (commonly referred to as LHDs) and multi-ton  
28 haul-trucks or buggies. Split-shooting also might be used in areas with narrow ore seams. In this  
29 technique, waste rock would be drilled, blasted, and mucked. The same process would then be  
30 used to remove the ore seam. After the ore seam was removed, shotcreting, rockbolting,  
31 timbering, or other methods would be used to support the mined-out areas.  
32

33 The continuous-miner technique would use a machine referred to as a “miner,” which removes  
34 ore and waste-rock without disturbing the surrounding host rock. The miner would deliver the  
35 ore and waste-rock directly to haul trucks for removal. As in the conventional technique,  
36 shotcreting, rockbolting, netting, timbering, or other methods would then be used to support the  
37 mined-out areas.  
38

39 Ore removed from the mine would be stockpiled outside the mine for transport to the milling  
40 facilities by traditional over-the-road haul trucks.  
41

42 During the course of underground mining, water would be needed to perform mining activities.  
43 Water would be required for underground drilling to prevent dust from becoming airborne and to  
44 remove cuttings from drill bits. Leaseholders could obtain water from a variety of sources,  
45 depending on the particular mine and its geographic location. Most underground mines are  
46 relatively dry; however, some mines receive seepage from nearby shallow aquifers. This water  
47 could be considered as a possible source for several of the mine operations. Other sources might  
48 include nearby municipal water supplies, springs, rivers, small ponds, and reservoirs. If water  
49 were not available on site, it would be obtained from the closest available source and hauled to

the mine by water trucks. The amount of water needed would depend on the level of mining operation and the number of people working at the site. Permits and/or water right augmentations, if required, would be obtained from the appropriate local, state, or federal agencies.

The following operating conditions are considered appropriate for full production of ore on each of the 38 lease tracts; quantities of water for domestic use and surface drilling are not included.

- 120 drilling machines in operation
- 35 gallons of water per drilling machine per day
- 26 days of operation per month
- Multiple shift operations

Assuming historical amounts of ore would be produced under the Expanded Program alternative, about 10,000 gallons of water would be used monthly by each mining operation, which would be equivalent to the average amount consumed by 1.5 households. More than 90 percent of the water needed would be obtained from commercial sources. Continued use of this quantity of water would not have a noticeable impact on available water resources and would not affect adjudicated water rights. Under the Existing Program alternative, the quantities of water needed would remain at 10,000 gallons per month for each mining operation.

### ***Surface/Open-Pit Mines***

Small surface mining operations generally would use a trenching method, which involves the removal of only a small amount of waste rock to expose the ore. The ore would then be removed by conventional techniques. Once the ore was removed, reclamation would consist of backfilling the trench with waste rock materials and regrading and recontouring the immediate areas of disturbance.

Larger operations generally would opt for a traditional, benched open pit in which the depth and size of the ore deposit would dictate the surface dimensions of the pit and benches. Underground mines, which would be used to access ore deposits around the periphery of the main deposit, might be associated with larger open-pit operations. The maintenance required for open-pit mine operations basically would be limited to maintaining the side walls of the pit, which would be subject to slope failure and to erosion from storm-water runoff. DOE's estimate of future disturbance assumes no new open-pit mines would be proposed. However, acreage of current disturbance includes the existing 200-acre open-pit mine at lease tract 7.

### ***Transportation***

Uranium and vanadium ores produced on the lease tracts would be transported to an existing mill or receiving facility for processing. Currently, two mills might be available for processing lease tract ores: the White Mesa Mill near Blanding, Utah, and the Cañon City Mill near Cañon City, Colorado. A third mill, the Shootaring Canyon Mill near Ticaboo, Utah, is currently amending its license to become operational and might be available in the future for processing ores. Use of this milling facility by the leaseholders for processing lease tract ores is unlikely because of the additional transportation costs that would be incurred by bypassing the White Mesa Mill.

Before transporting ore to the processing mills, the leaseholder would be required to comply with DOT hazardous materials regulations codified at 49 CFR 170–180. These regulations require the leaseholder to identify the actions that would be taken in case of an emergency or spill. Ore could be transported to the mills by covered truck, covered truck and pup (trailer), train, or a combination of truck and train. However, the train and truck-and-train methods would not be economical during the next 10 years because a railroad loading facility no longer exists in the lease tract areas. In this EA, only the covered truck and covered truck-and-pup methods are assessed.

Typically, the collector routes, leading from the lease tracts to the various paved highways discussed herein, are county roads that were utilized extensively for ore-transportation activities in the past, particularly during the last uranium boom in the late 1970s and early 1980s. Other undeveloped roadways might need to be upgraded in the future, and those would be identified and dealt with as the need arises through the county's conditional use permit process.

#### *Expanded Program Alternative—DOE's Preferred Alternative*

Figure 3–2 shows the potential haul routes for the Expanded Program alternative. To support the discussions of impacts in Section 5.2.1 and Table 5–1, highway segments have been alphabetically labeled on Figure 3–2 from “A” to “MM.” Two primary routes access the Cañon City Mill, and three primary routes access the White Mesa Mill. For the Expanded Program alternative, it is assumed that the northernmost routes to either mill would be used only by haul trucks traveling from tracts near the Gateway area; this route would be more indirect for other lease tracts.

Hauling ore along the northernmost route to the Cañon City Mill would require transport through Mesa, Delta, Montrose, Ouray, Gunnison, Chaffee, and Fremont Counties, Colorado. BLM roads, county roads, and State Highway 141 would serve as collector routes from the lease tracts. Haul trucks traveling along State Highway 141 would meet with U.S. Highway 50 at Whitewater, southeast of Grand Junction. Haul trucks would travel through Delta, Olathe, Montrose, Gunnison, Salida, and Cañon City to the Cañon City Mill. The total distance along this route to the Cañon City Mill would be approximately 280 miles. More than 90 percent of these routes are paved and have at least two lanes; four-lane roads exist from Grand Junction to Montrose and near the cities of Gunnison and Cañon City.

Hauling ore to the Cañon City Mill along the southern route would require transport through Mesa, San Miguel, Montrose, Ouray, Gunnison, Chaffee, and Fremont Counties, Colorado. BLM roads, county roads, and State Highways 90 and 141 would serve as collector routes from the lease tracts. These collector routes meet with State Highway 145 about 5 miles east of Naturita. Haul trucks would proceed southeast along State Highway 145 through Norwood to Placerville, then northeast to Ridgway along State Highway 62. At Ridgway, the haul trucks would proceed north to Montrose along U.S. Highway 550, then east onto U.S. Highway 50 through Gunnison, Salida, and Cañon City to the Cañon City Mill. The maximum total distance from the most distant lease tracts to the Cañon City Mill is approximately 320 miles.

Hauling ore along the northernmost route to the White Mesa Mill (however unlikely) would include transport through Mesa County, Colorado, and Grand and San Juan Counties, Utah. Collector routes from the lease tracts would include BLM roads, county roads, and State Highway 141. At Whitewater, haul trucks would travel on U.S. Highway 50 until it joined with the U.S. Interstate 70 business route in Grand Junction, then west along U.S. Interstate 70 into



Utah. At the Crescent Junction exit, haul trucks would travel south on U.S. Highway 191 through Moab, Monticello, and Blanding to the White Mesa Mill. The mill is approximately 6 miles south of Blanding. Depending on point of origin, the total distance is approximately 270 miles. With the exception of BLM roads and county roads, all roads are paved and have at least two lanes. U.S. Interstate 70 and a portion of U.S. 191 have four lanes.

Hauling ore along the middle route to the White Mesa Mill would include transport through Montrose and San Miguel Counties, Colorado, and San Juan County, Utah. Collector routes from the lease tracts would include BLM roads, county roads, and State Highways 141 and 90. At the Utah-Colorado border, State Highway 90 changes to Utah State Highway 46. Haul trucks would proceed west along Utah State Highway 46 through La Sal to the intersection with U.S. Highway 191, then south through Monticello and Blanding to the White Mesa Mill. The mill is approximately 6 miles south of Blanding. The total distance from the lease tracts to the White Mesa Mill varies between 100 and 160 miles, depending on point of origin. More than 90 percent of the route consists of paved, two-lane roads; four-lane roads exist in Monticello and Blanding.

Hauling ore along the southern route to the White Mesa Mill would require transport through Montrose, San Miguel, and Dolores Counties, Colorado, and San Juan County, Utah. The collector routes would be the same as those used for the northern route. At the intersection of State Highway 141 and U.S. Highway 491 near Dove Creek, the haul trucks would proceed west along U.S. Highway 491 to Monticello, Utah, then south on U.S. Highway 191 through Blanding to the White Mesa Mill. The total distance from the lease tracts to the White Mesa Mill varies between 70 and 170 miles, depending on point of origin.

Most leaseholders would prefer to transport ore to the White Mesa Mill because of its proximity to the lease tracts. However, depending on mill-feed requirements, leaseholders would retain the right to transport ore to the Cañon City Mill when mill feed and economic conditions warrant.

For the Expanded Program alternative, the number of haul trucks transporting ore to the mills is expected to increase compared to the Existing Program alternative. The average haul rate during periods of production between 1974 and 1994 was 30 haul trucks per day for all the DOE lease tracts combined, and this number is assumed for the Existing Program alternative. In 1980, when ore production from the lease tracts was at its peak, the haul rate never exceeded 40 haul trucks per day. For the Expanded Program alternative, the maximum haul rate to either facility is projected to be an average of 120 and not more than 150 haul trucks (or truck-and-pup combinations) per day (one way) or three to four haul trucks per lease tract. The average haul-rate figure (120 haul trucks) is based on the estimated number and sizes of the mining operations (as discussed previously in Section 3.2), the capacity of the haul trucks (25 tons), and the number of days per month (30). Accordingly, the estimated production rate for the 38 lease tracts under the expanded alternative would be 90,000 tons of ore per month, which equates to 3,600 haul trucks per month, or 120 haul trucks per day, one way.

#### *Existing Program Alternative*

Figure 3–3 shows the haul routes to the processing mills for the Existing Program alternative. One primary route accesses the Cañon City Mill, and two primary routes access the White Mesa Mill. To support the discussions of impacts in Section 5.2.2 and Table 5–2, highway segments have been alphabetically labeled on Figure 3–3 from “A” to “Z.”



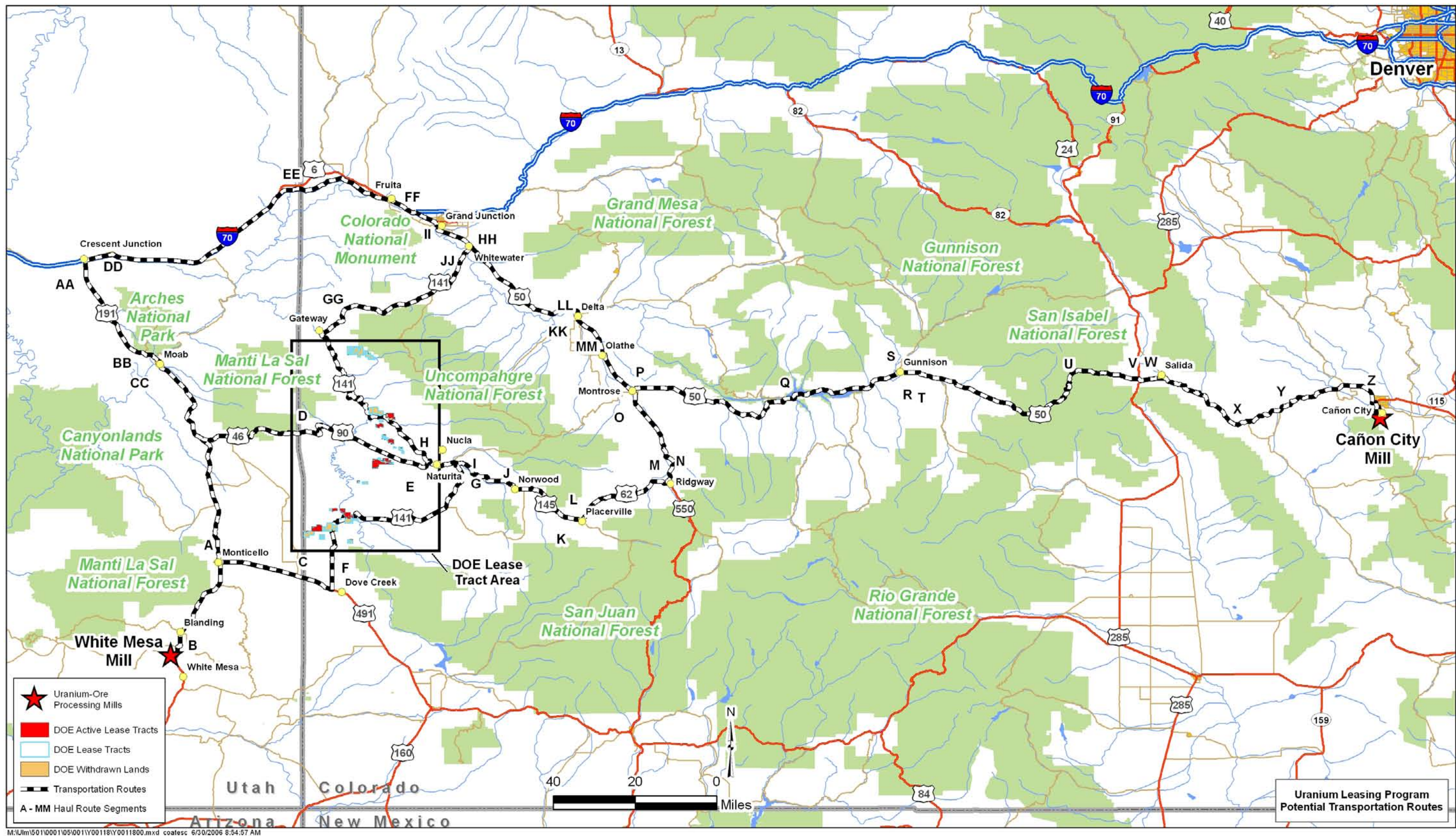


Figure 3-2. Expanded Alternative Transportation Haul Routes



Under the Existing Program alternative, hauling ore to the Cañon City Mill would require transport through San Miguel, Montrose, Ouray, Gunnison, Chaffee, and Fremont Counties, Colorado. BLM roads, county roads, and State Highways 90 and 141 would serve as collector routes from the lease tracts. These collector routes meet with State Highway 145 about 5 miles east of Naturita. Haul trucks would proceed southeast along State Highway 145 through Norwood to Placerville, then northeast to Ridgway along State Highway 62. At Ridgway, the haul trucks would proceed north to Montrose along U.S. Highway 550, then east onto U.S. Highway 50 through Gunnison, Salida, and Cañon City to the Cañon City Mill. The maximum total distance from the most distant lease tracts to the Cañon City Mill is approximately 320 miles.

Hauling ore along the northern route to the White Mesa Mill under the Existing Program alternative would include transport through Montrose and San Miguel Counties, Colorado, and San Juan County, Utah. Collector routes from the lease tracts would include BLM roads, county roads, and State Highways 90 and 141. At the Utah-Colorado border, State Highway 90 changes to Utah State Highway 46. Haul trucks would proceed west along Utah State Highway 46 through La Sal to the intersection with U.S. Highway 191, then south through Monticello and Blanding to the White Mesa Mill. The mill is approximately 6 miles south of Blanding. The total distance from the lease tracts to the White Mesa Mill varies between 100 and 120 miles. More than 90 percent of the route is paved, two-lane roads; four-lane roads exist in Monticello and Blanding.

Hauling ore along the southern route to the White Mesa Mill would require transport through Montrose, San Miguel, and Dolores Counties, Colorado, and San Juan County, Utah. The collector routes would be the same as those used for the northern route. At the intersection of State Highway 141 and U.S. Highway 491 near Dove Creek, the haul trucks would travel west along U.S. Highway 491 to Monticello, Utah, and then south on U.S. Highway 191 through Blanding to the White Mesa Mill. The total distance from the lease tracts to the White Mesa Mill varies between 70 and 130 miles.

### **3.5.3 Postoperational Activities**

#### **3.5.3.1 Interim Shutdown Activities**

Temporary shutdown of mine operations or an interim period of curtailed operations might be necessary as a result of unforeseen circumstances, such as a decrease in market demand for processed uranium or vanadium. However, maintenance to prevent deterioration of facilities would still be required. In this case, DOE, state permitting agencies, and local and county officials would be notified, as appropriate, to determine actions necessary to temporarily secure plant facilities and equipment. Securing plant facilities would include measures necessary to demonstrate due diligence in ensuring preservation of human health, safety, and environmental resources. Interim shutdown activities could include the following activities:

- Establishing barriers to physical, chemical, and radiological hazards. Conditions hazardous to human health, safety, or the environment (including ore stockpiles, waste piles, open pits, mine portals, subsidence holes, and excavated surface depressions) would be fenced and posted or closed (filled) if they were not an integral part of the lease operation and would not be used in the foreseeable future. Mine openings, vents (near-vertical passages into

mines that provide additional ventilation), fans, electric lines, and other support facilities would be maintained to prevent safety hazards.

- Continuing underground mine maintenance. Mines might be actively dewatered and walls might be shored, as necessary, to prevent collapse of the host sedimentary formations inside portals. Air and electrical systems would be maintained in operating condition.
- Controlling fugitive dust. This activity might include seeding disturbed areas with annual and/or perennial vegetation, watering, or applying commercially available dust suppressants.
- Controlling erosion and storm-water runoff. This activity might include constructing water bars, berms, ditches, or silt fences to control erosion and storm-water runoff.

Temporary closure might be required for access roads that could be needed at a later date. Roads would be reclaimed sufficiently to control dust and storm-water runoff, and barriers would be constructed to prevent access by other land users.

Immediately following temporary closure, those disturbed areas identified by the leaseholder as not being needed for future operations would be promptly reclaimed (1) in accordance with the reclamation provisions included in the approved Mining Plan and (2) consistent with the reclamation guidance document, *United States Department of Interior, Colorado Bureau of Land Management, Closure/Reclamation Guidelines for Abandoned Uranium Mine Sites*. In addition, inventory items that might deteriorate or that have the potential for creating environmental damage (e.g., first-aid supplies, explosives, batteries, oil, and gas) would be moved off site. Hardware such as nails, pipes, and compressors that were left on site would be secured in place. Liquid or solid materials that were not approved for on-site disposal would be removed from the lease tract and disposed of at permitted facilities.

### 3.5.3.2 Permanent Shutdown Activities

When mining activities are completed at a location where there are no future intended lease activities, the leaseholder would be required to initiate reclamation activities (1) in accordance with the reclamation provisions included in the approved Mining Plan and (2) consistent with the reclamation guidance document, *United States Department of Interior, Colorado Bureau of Land Management, Closure/Reclamation Guidelines for Abandoned Uranium Mine Sites*.

At mine sites, surface-plant improvements would be removed in accordance with DOE and other agency requirements. Debris and waste (hazardous and nonhazardous but excluding mine-waste-rock) would be managed and transported to a permitted landfill for disposal. Pond liners and precipitated sediments would be removed from discharge/treatment ponds, transported, and disposed of at a state-approved facility. Leaseholders would be required to fully comply with applicable DOT requirements (49 CFR 100–180). Hazardous waste would be removed from the lease tracts and transported to a Resource Conservation and Recovery Act-permitted facility. Hazardous materials (those that do not qualify as a waste) would be removed from the lease tracts and disposed of in accordance with applicable state and federal regulations. Consideration would be given to recycling or returning the materials to the manufacturers.



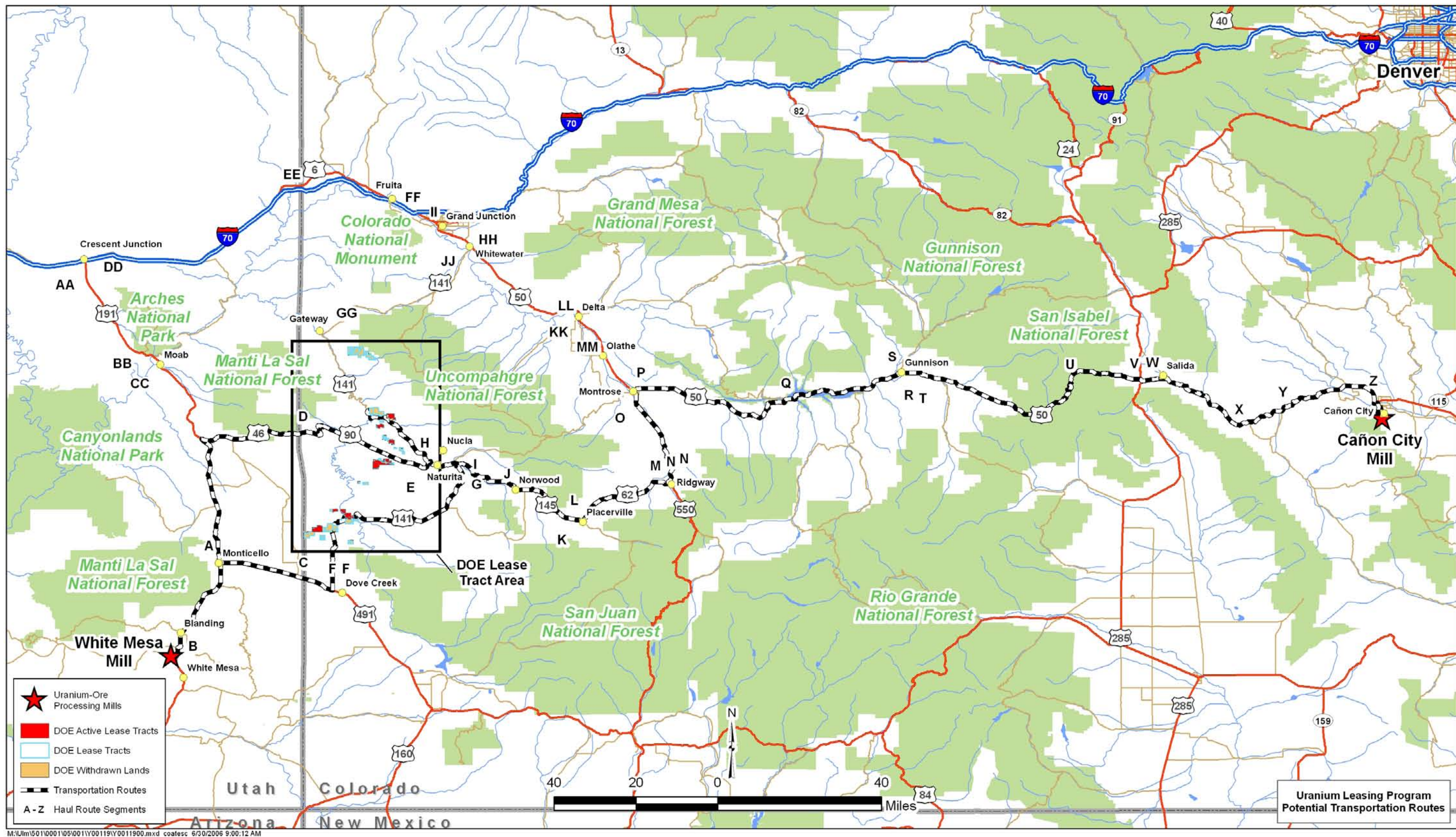


Figure 3-3. Existing Alternative Transportation Haul Routes



1  
2 CDOW, USFWA, and/or BLM, as appropriate, would be contacted before reclamation to ensure  
3 that wildlife species that might have taken up residence (e.g., bats or birds species listed as  
4 sensitive) would not be adversely affected by permanent shutdown activities. Ecosystem  
5 concerns associated with wetland areas would be addressed if a determination was made that  
6 wetlands were created as a result of mining operations.  
7

8 Pond sediments and associated soils containing contaminants inherent in the ore would be  
9 managed as radioactive material. Pollutants, contaminants, wastes, or contaminated media that  
10 are not inherent to site geology would be removed from the site and managed as waste under  
11 state or federal regulations.  
12

13 Reclamation would include recontouring the land to restore the original topography as nearly as  
14 practicable, replacing surface soil material, implementing erosion-control measures, and  
15 revegetating disturbed areas with appropriate native and adapted species. Open shafts, adits, and  
16 inclines would be closed. Mine-waste-rock piles, residual ores, and other radioactive materials  
17 inherent to the site would be placed in the mine or would be graded to 3:1 slopes or less,  
18 contoured, covered with surface soil material, and seeded in accordance with an approved  
19 Reclamation Plan. In areas where stockpiled surface soil material was insufficient, surface soil  
20 material might be borrowed from other areas of the lease tract or from areas pre-approved by  
21 BLM. DOE would monitor reclamation success annually and would require the leaseholder to  
22 correct problems until the reclamation met DOE requirements.  
23  
24

End of current text

## 4.0 Affected Environment

This section describes the environmental setting on and near DOE's lease tracts and elements of the environment that the alternatives described in Section 3.0 may affect. Most of the land disturbances associated with the lease tracts occurred in the 1970s and 1980s during the most recent uranium boom. This section describes the lease tracts as they exist today. Because this EA is intended to meet the requirements of a programmatic EA, most of the descriptions are not lease-specific but pertain to general site conditions on the DOE-managed lands. Where there are known sensitive resources, however, lease-specific issues are addressed. Table 3-2 lists site features pertaining to mining activities that are currently present on the 38 lease tracts.

### 4.1 Environmental Setting

DOE's lease tracts are located in the western portions of Mesa, Montrose, and San Miguel Counties in southwestern Colorado (see Figure 1-1). This semiarid area is characterized by low precipitation and humidity, high evaporation, sunny days, clear nights, and extreme daily temperature changes. Annual precipitation averages 7 to 12 inches, and monthly precipitation may range from zero to several inches. Elevations of the mesas and valleys throughout the area vary from 5,500 ft above sea level in the valleys to approximately 8,000 ft above sea level on top of the higher mesas. Prevailing winds are from the southwest at speeds of 3 to 4 miles per hour; however, wind direction and velocity may vary depending on local topographic features. The lease tracts are located in four geographical areas within Mesa, Montrose, and San Miguel Counties and are referred to as the Gateway, Uravan, Paradox Valley, and Slick Rock lease tracts.

The Gateway lease tracts (26, 26A, 27, and 27A) are remote; access is via county roads from State Highway 141, and the tracts are located on the tops and side slopes of Outlaw and Calamity Mesas (Figure 4-1). Elevations of these tracts range from 5,700 to 7,000 ft above sea level. Surface runoff from these areas travels through Maverick and Calamity Creeks, both tributaries of the Dolores River.

Relatively resistant sandstones and conglomerates of the Burro Canyon Formation cap Calamity and Outlaw Mesas. Side slopes below the rims are formed by the mudstones, shales, and sandstones of the Brushy Basin Member and the underlying Salt Wash Member of the Morrison Formation. The primary ore-bearing zones occur in prominent sandstone units of the Salt Wash Member, where uranium and vanadium are concentrated in organic-rich regions of the sandstones. These ore-bearing units have been mined extensively for nearly 100 years. Below the Morrison Formation, in descending order, are the sandstones, siltstones, and shales of the Wanakah Formation (formerly called the Summerville Formation) and the Entrada Sandstone, Kayenta, Wingate Sandstone, and Chinle Formations. The canyon bottoms that incise these mesas and lowest slopes along the Dolores River generally consist of Quaternary to Holocene (formerly known as Recent) stream sediments.

The Uravan lease tracts (18, 19, 19A, 20, 24, and 25) are adjacent to State Highway 141 in Montrose County, near the historical community of Uravan that has only two remaining buildings, and are located on the tops and side slopes of Spring Creek, Atkinson, and Club Mesas (Figure 4-2). Elevations of these tracts range from 5,700 to 6,200 ft above sea level. Two major



1 rivers flow in the valley bottoms below the lease tracts in this region: the Dolores River and its  
2 main tributary, the San Miguel River.

3  
4 In general, the mesas are rimmed and capped by the relatively resistant Dakota Sandstone and  
5 Burro Canyon Formations. Side slopes below the rim are formed by the mudstones, shale, and  
6 sandstones of the Brushy Basin and Salt Wash Members of the Morrison Formation. The  
7 primary ore-bearing unit is the Salt Wash Member, which is composed of fluvial sandstone  
8 interbedded with mudstone. This ore-bearing member has been mined extensively. The canyon  
9 bottom and lower slopes along the Dolores and San Miguel Rivers are formed by unconsolidated  
10 fluvial deposits, the Wanakah Formation (formerly the Summerville Formation), and the Entrada  
11 Sandstone. Below the Entrada Sandstone are sandstones, siltstones, and shales of the Kayenta,  
12 Wingate, and Chinle Formations.

13  
14 The Paradox Valley lease tracts (Figure 4–3) are in Montrose and San Miguel Counties. Paradox  
15 Valley is a broad valley that is flanked on either side by the high plateaus of Monogram Mesa  
16 and Long Park. Elevation of the valley floor is 5,500 to 5,600 ft above sea level, which is about  
17 1,000 ft lower than the tops of the adjacent mesas. Lease tracts 5, 5A, 6, 7, 7A, and a portion of  
18 lease tracts 8 and 8A are on the steep northeast aspect of Monogram Mesa on the southwest flank  
19 of the valley. The remainder of lease tract 8 and all of lease tract 9 are located on the top of  
20 Monogram Mesa. Lease tracts 17 and 17A are located farther to the southwest on top of Radium  
21 Mountain and Wedding Bell Mountain, respectively. Lease tracts 21, 22, 22A, 23, 23A, and 23B  
22 are on the northeast flank of Paradox Valley on the Long Park plateau.

23  
24 The steep northeast aspect of Monogram Mesa is formed by a series of structurally complex,  
25 faulted slump blocks composed mainly of mudstones, shale, and sandstones of the Brushy Basin  
26 and Salt Wash Members of the Morrison Formation. The Burro Canyon and Dakota Sandstone  
27 Formations form the caprock of Monogram Mesa and overlie the Morrison Formation. Geology  
28 of the Long Park plateau is similar to that of Monogram Mesa, except that the formations dip to  
29 the northeast. The lease tracts on the Long Park plateau overlie the Brushy Basin Member of the  
30 Morrison Formation.

31  
32 The Slick Rock lease tracts are located near the historical community of Slick Rock in San  
33 Miguel County (Figure 4–4). In this area, the land surface is deeply incised by the north-flowing  
34 Dolores River and its tributaries. The Dolores River Canyon is approximately 500 ft wide at the  
35 bottom and is characterized by steep slopes and sheer cliffs. Lease tracts 13, 13A, 14, and 14A  
36 lie within the canyon or on adjacent ridges. Lease tracts 15 and 15A are located west of and  
37 above the Dolores River on the first topographic bench. Lease tracts 11 and 11A lie southwest of  
38 Slick Rock on the western flank of Summit Canyon, near the top of Summit Point. Lease tracts  
39 10, 12, 16, and 16A lie on both sides of State Highway 141, just south of the top of Slick Rock  
40 Hill. Slick Rock lease tract elevations range from 5,700 ft above sea level along the Dolores  
41 River to nearly 8,000 ft above sea level on the mesa top east and north of Egnar, Colorado.

42  
43 The floor and lower slopes of the Dolores River Canyon consist of unconsolidated fluvial  
44 deposits and alluvial/colluvial deposits, respectively. Sediments on the canyon floor are  
45 underlain by the Entrada Sandstone. Bedrock formations that form the canyon walls and  
46 adjoining mesas include, in ascending order, the Salt Wash and Brushy Basin Members of the  
47 Morrison Formation, the Burro Canyon Formation, and the Dakota Sandstone.

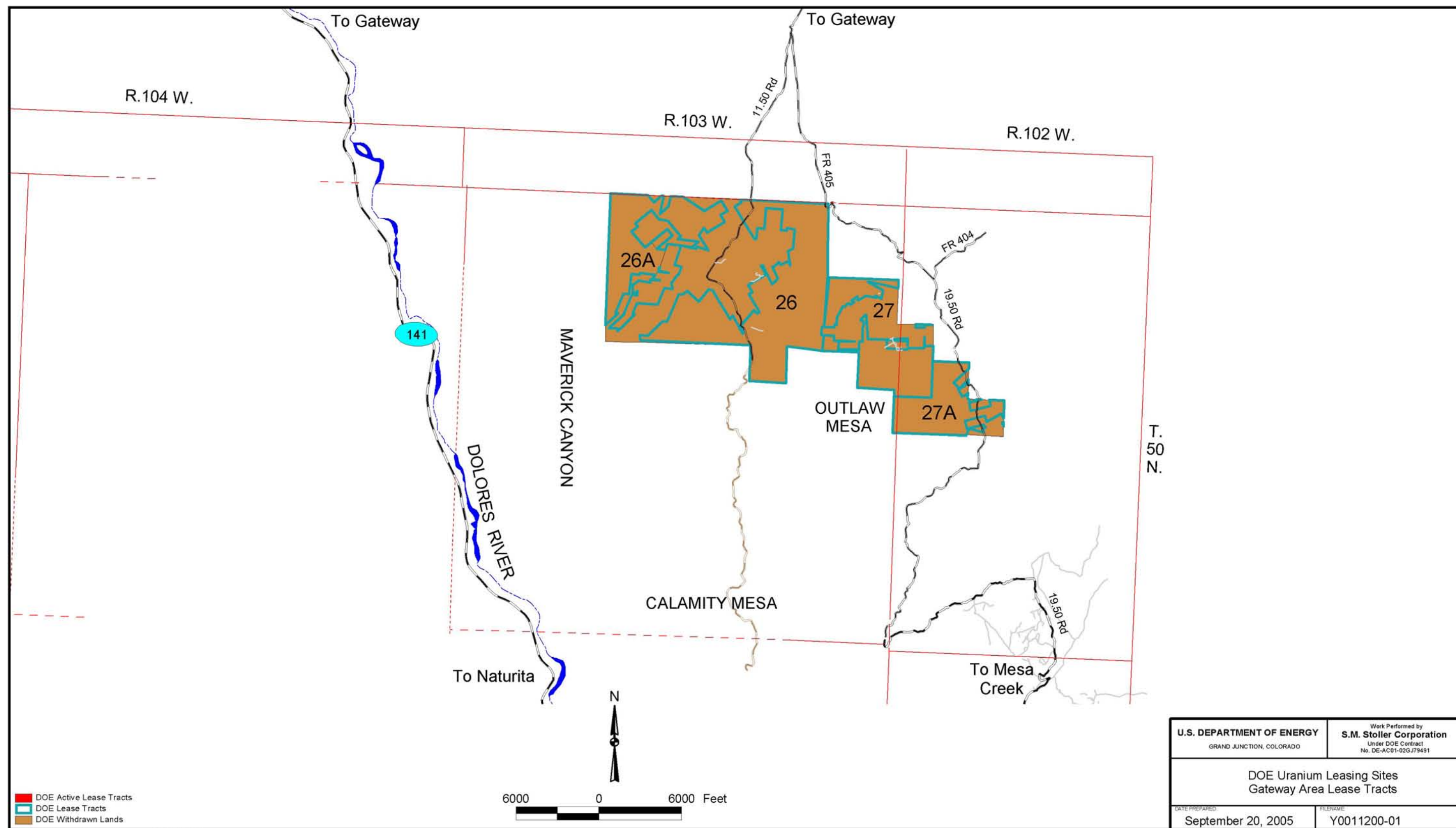


Figure 4-1. Gateway Lease Tracts

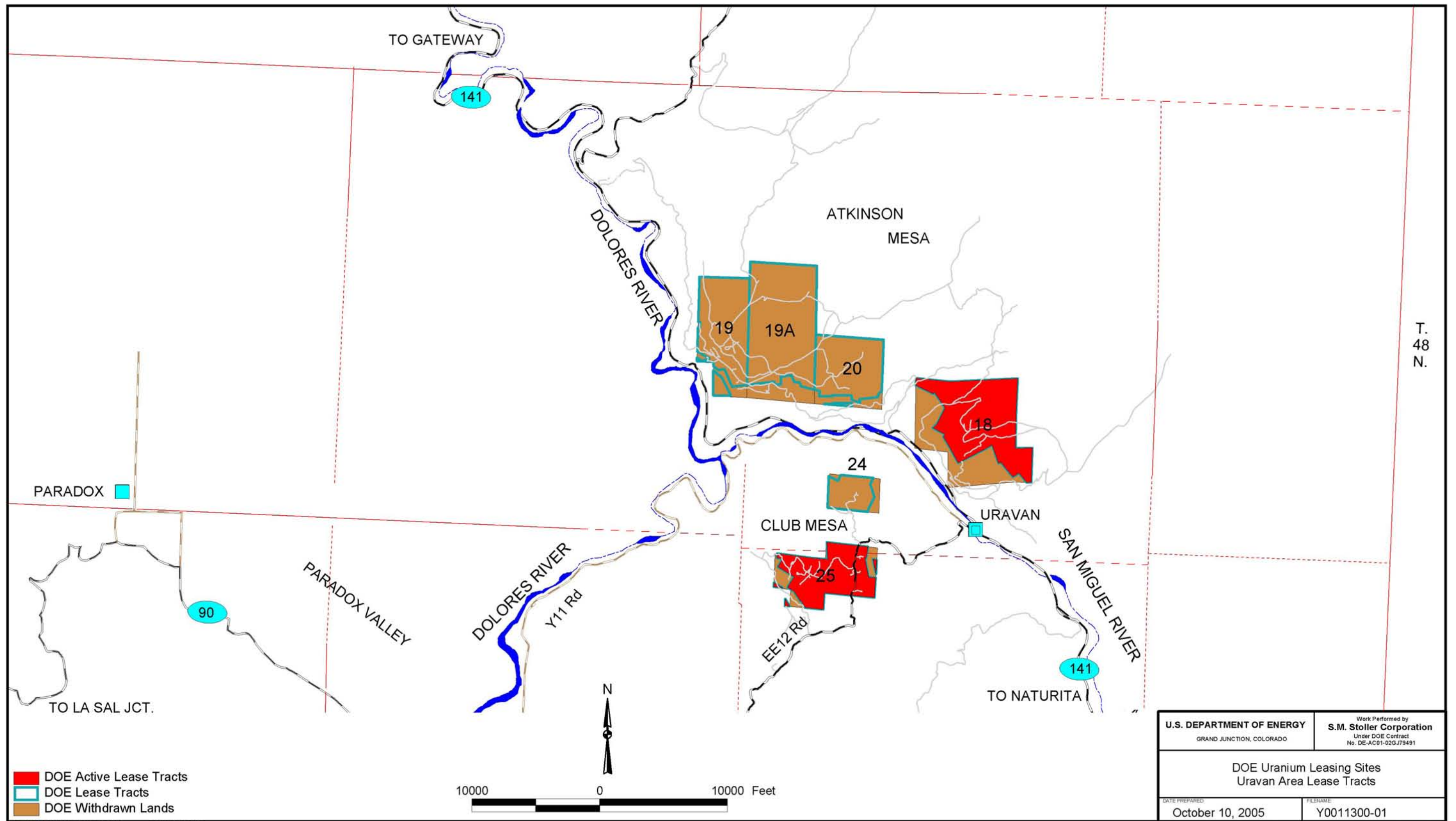


Figure 4-2. Uravan Lease Tracts



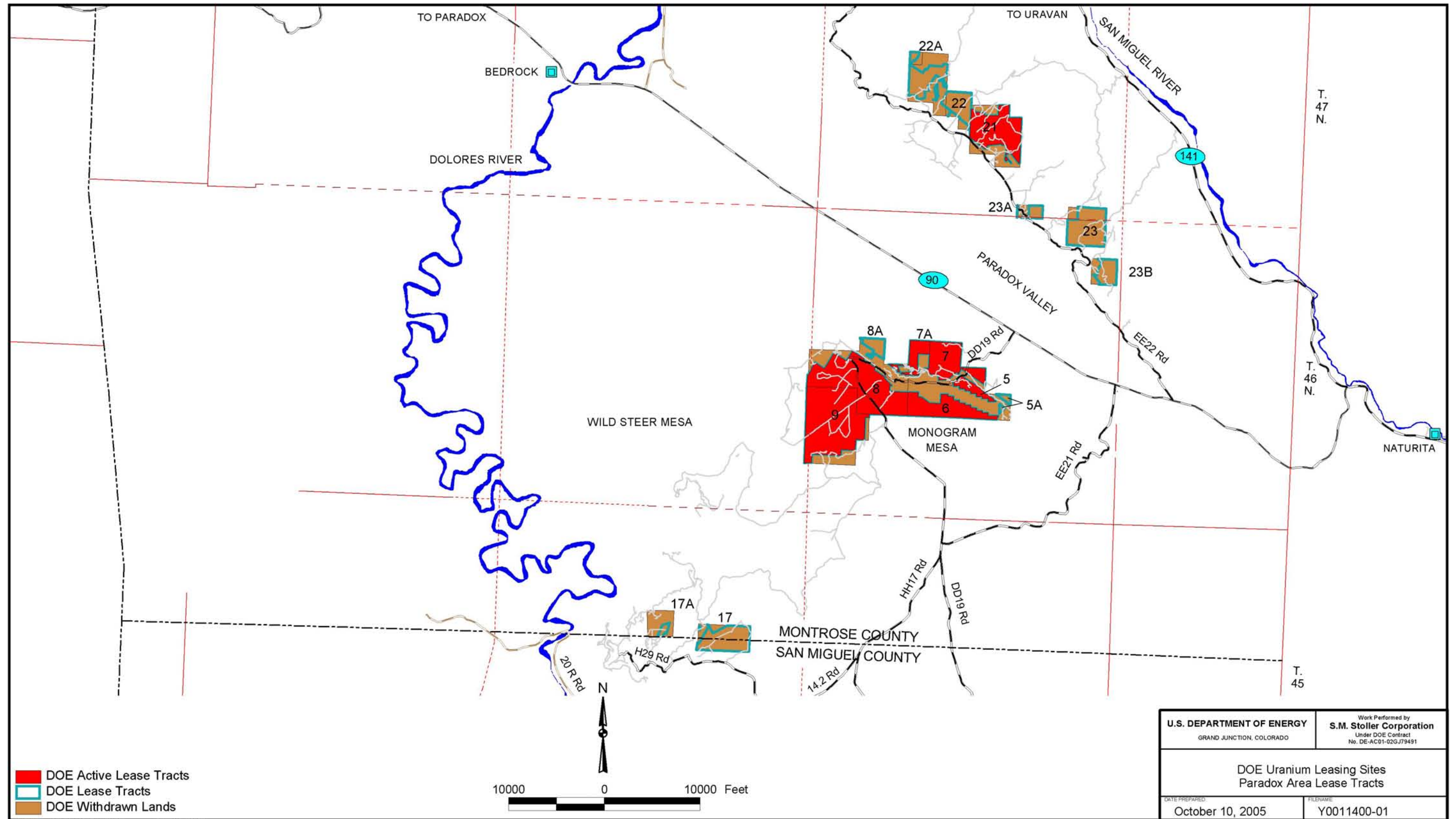


Figure 4-3. Paradox Valley Lease Tracts

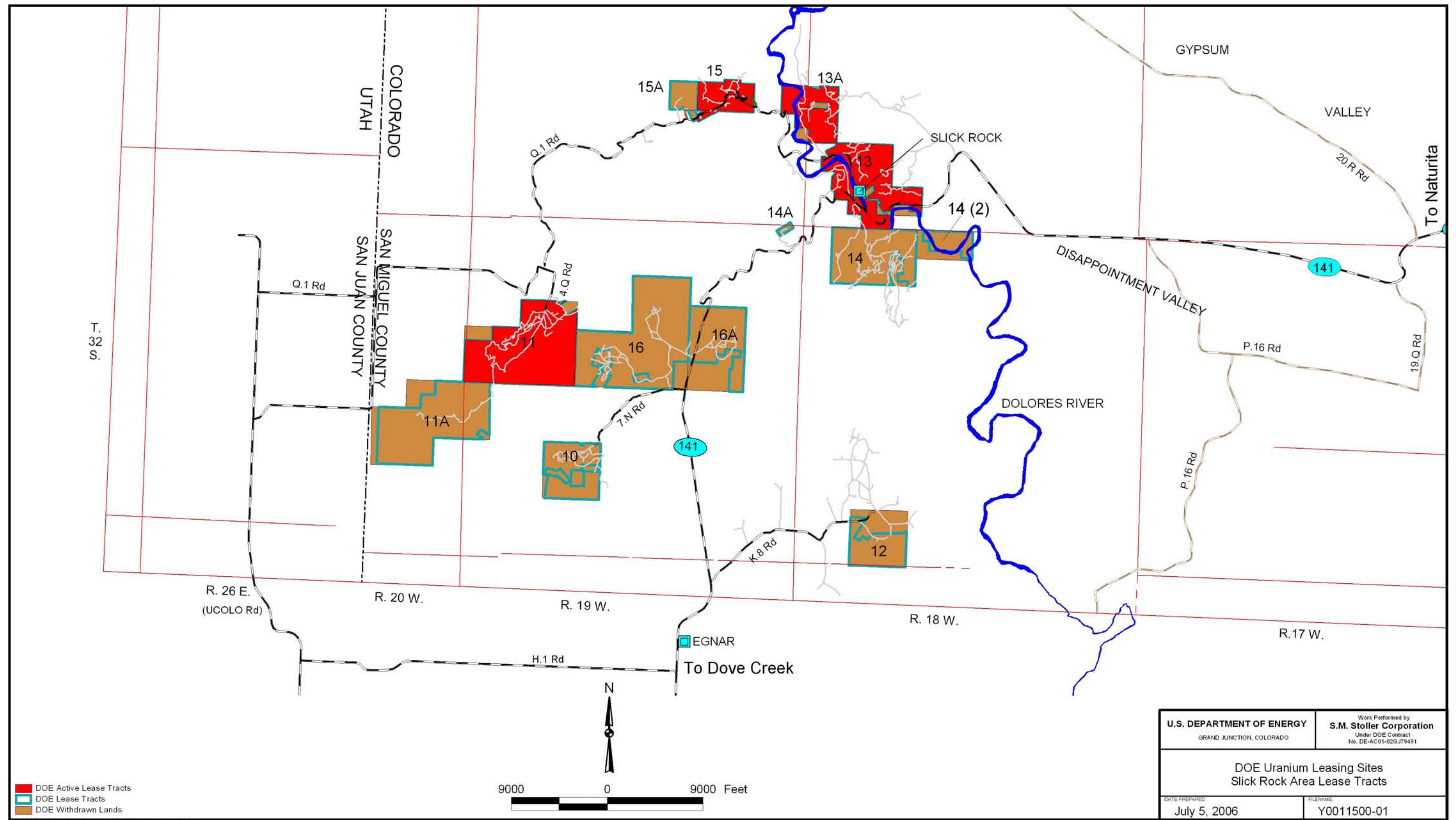


Figure 4-4. Slick Rock Lease Tracts

1  
2  
3  
4  
5

## 4.2 Socioeconomics

### 4.2.1 Population

As shown on Figures 4–1, 4–2, 4–3, and 4–4, the uranium lease tracts are located in western Colorado in remote parts of Mesa, Montrose, and San Miguel Counties. Only 17 residences exist within 1 mile of the 38 lease tracts; 7 of the 17 residences are adjacent to the 13 existing leases. Except for the cities of Montrose and Grand Junction, which are each more than 50 miles from the nearest lease tract, the region is sparsely populated and has few towns. Table 4–1 presents the 2000 census population of the counties and towns in the region within a 1- to 1.5-hour commute to a lease tract.

Table 4–1. Population in the Region of the Uranium Lease Tracts

County	City/Town	Population <sup>a</sup>
Mesa		116,255
	Grand Junction	41,986
Montrose		33,432
	Montrose	12,344
	Naturita	635
	Nucla	734
San Miguel		6,594
	Norwood	438
Dolores		1,844
	Dove Creek	698
Ouray		3,742
	Ridgway	713

<sup>a</sup>Census Bureau 2004.

Cañon City, Colorado, and Blanding, Utah, the cities nearest the two ore-processing mills, have populations of approximately 15,431 and 3,162, respectively. Cañon City is the largest city in Fremont County, which has a population of approximately 46,145. Blanding is the largest town in San Juan County, which has a population of approximately 14,413.

### 4.2.2 Housing

Table 4–2 shows total housing units and vacancy rates for the counties and towns within the region of the uranium lease tracts.

Table 4–2. Housing Availability in the Region of the Uranium Lease Tracts

County	City/Town	Housing Units			Percent Vacancy		
		2000 <sup>a</sup>	2003 <sup>b</sup>	Percent Increase	2000 <sup>a</sup>	2003 <sup>b</sup>	Difference in Percentage Points
Mesa		48,427	53,437	10.4	5.4	7.6	+2.2
	Grand Junction	18,784	21,633	13.2	4.9	8.2	+3.3
Montrose		14,202	15,191	7.0	8.2	7.1	–1.1
	Montrose	5,581	6,476	16.0	6.0	4.2	–1.8
	Naturita	314	323	2.9	18.2	18.0	–0.2
	Nucla	369	369	0	15.7	15.7	0
San Miguel		5,197	5,575	7.3	42.0	41.1	–0.9
	Norwood	258	278	7.8	24.4	23.4	–1.0
Dolores		1,193	1,217	2.0	34.2	35.3	+1.1
	Dove Creek	326	326	0	12.6	13.8	+0.8
Ouray		2,146	2,415	12.5	26.6	30.0	+4.0
	Ridgway	318	352	10.7	10.4	13.7	+3.3

<sup>a</sup>U.S. Census Bureau 2004.

<sup>b</sup>CDO 2005.

From 2000 to 2003, the available housing units increased in the more populated counties and cities, while little- to-no increase in housing units occurred in the smaller counties and towns of the region. The highest vacancy rates occurred in the rural counties and rural towns nearest the uranium lease tracts, and, the vacancy rates changed only slightly between 2000 and 2003 with the exception of Mesa and Montrose Counties.

#### 4.2.3 Employment and Economic Structure

As shown on Table 4–3, unemployment in Mesa, Montrose, and San Miguel Counties in which the uranium lease tracts are located was slightly below the Colorado average of 5.2 percent in June 2005. The unemployment rates in Fremont and San Juan counties, where the ore-processing mills are located, were higher than the state averages. Except for San Miguel County, family and individual incomes in 2000 were lower than the state averages in these rural counties; the higher income in San Miguel County is attributable to the higher incomes of residents in the resort town of Telluride.

Table 4–3. Unemployment and Income Characteristics in the Region of the Uranium Lease Tracts

State	County	Percent Unemployment (June 2005)	Median Family Income <sup>d</sup> (dollars)	Per Capita Income <sup>d</sup> (dollars)
Colorado <sup>a</sup>		5.2	55,883	24,049
	Mesa	4.9	43,009	18,715
	Montrose	4.5	40,849	17,158
	San Miguel	3.9	60,417	35,329
	Dolores	5.8	38,000	17,106
	Ouray	2.9	49,776	24,335
	Fremont	6.2	42,303	17,420
Utah <sup>b</sup>		4.7	51,022	18,185
	San Juan	11.4 <sup>c</sup>	31,673	10,229

<sup>a</sup>CDLE 2005.

<sup>b</sup>Utah Department of Workforce Services.

<sup>c</sup>Most recent county data June 2004.

<sup>d</sup>U.S. Census Bureau 2004.

In 2000, mining represented a small percentage of the overall workforce in and around the lease tract areas. More significant percentages of the workforce in the region are represented by construction; the retail trade; education, health services, and social services; and arts, entertainment, recreation, accommodations, and food service.

Table 4–4. Workforce Characteristics in the Region of the Uranium Lease Tracts<sup>a</sup>

Industry	Percentages by County						
	Mesa	Montrose	San Miguel	Dolores	Ouray	Freemont	San Juan
Agriculture, forestry, fishing and hunting, and mining	3.0	6.0	2.5	12.3	6.2	3.3	7.3
Construction	10.4	15.0	16.2	17.1	18.6	10.7	10.1
Manufacturing	7.2	8.4	2.7	3.2	5.6	7.8	5.1
Wholesale trade	3.8	2.5	1.2	2.7	1.9	1.8	1.4
Retail trade	13.4	13.6	10.7	14.1	8.9	11.8	10.8
Transportation, warehousing, and utilities	5.5	5.1	4.0	4.3	2.1	4.4	3.7
Information management	2.6	1.3	2.8	1.7	2.2	2.2	1.1
Finance, insurance, real estate, and rental leasing	6.0	4.4	11.1	4.5	7.9	4.6	2.6
Professional, scientific, management, administrative, and waste management services	8.0	7.4	7.2	5.9	10.1	5.2	4.1
Educational, health, and social services	20.7	15.5	7.7	15.2	13.7	18.8	28.1
Arts, entertainment, recreation, accommodations, and food service	9.7	10.0	26.2	7.6	14.1	8.6	13.2
Other services	5.3	6.1	3.5	5.7	4.4	5.2	3.4
Public administration	4.4	4.6	4.2	5.7	4.2	15.6	9.1

<sup>a</sup>U.S. Census Bureau 2004.



1 In Cañon City, the largest employers are the Colorado Department of Corrections and the  
2 Federal Bureau of Prisons. The Cotter Corporation milling facility in Cañon City would employ  
3 approximately 140 people during full production operations for conventional uranium/vanadium  
4 ores; however, the facility only employs 34 people in its current status (standby/maintenance).

6 In San Juan County, Utah, the largest employers are local, state, and federal governments; the oil  
7 and gas industries; and agriculture. The International Uranium Corporation milling facility at  
8 White Mesa would employ approximately 140 people during full production operations for  
9 conventional uranium/vanadium ores; however, the facility employs less than 50 people in its  
10 current status (processing alternate feed materials).

### 12 **4.3 Transportation**

14 Numerous unimproved roads constructed on public lands exist on and around the lease tracts.  
15 Many of these roads were constructed by the mining and ranching industries before BLM  
16 developed regulations for authorizing road construction and use. However, many of these roads  
17 are currently maintained by county agencies or BLM.

19 Two major roadways traverse the lease tract areas: State Highway 141 and State Highway 90  
20 (see Figures 3–2 and 3–3). State Highway 141 is the primary access to the Uravan, Slick Rock,  
21 and Gateway lease tracts, and State Highway 90 is the primary access to the Paradox Valley  
22 lease tracts. Numerous county and BLM roads serve as the collector routes from the lease tracts  
23 to these state highways. Although most of these roads pass through uninhabited public lands,  
24 15 residences among the 38 lease tracts could be affected by ore shipments traveling these haul  
25 roads enroute to the state highways and, subsequently, to the ore-processing mills. Routes that  
26 pass 13 of the 15 residences have been used in the last 10 years to haul uranium ore, and all the  
27 routes have been used to haul ore in the last 30 years.

29 Subsection 3.5.2.2, “Mine Development and Operation,” describes the haul routes that haul  
30 trucks would take to transport ore from the lease tracts to the processing mills. On the basis of  
31 Colorado Department of Transportation (CDOT) highway statistics for calendar year 2000  
32 (CDOT 2000), the fatality and injury rates from accidents along all state highways were  
33 0.015 fatality per million vehicle miles and 0.63 injury per million vehicle miles. For total rural  
34 state highways, which represent the bulk of the haul routes, the fatality rate is about the same  
35 (0.018), and the accident rate is about half that of total highways (0.36 per million vehicle miles).

37 Information from CDOT and Utah DOT indicate that the majority of accidents occur at  
38 intersections and on curved sections of the highways. Primary locations of accidents along the  
39 haul routes include (1) intersections on U.S. Highway 50 in Montrose, (2) curved sections of  
40 U.S. Highway 50 approximately 10 miles east of Montrose, (3) curved sections of  
41 U.S. Highway 50 on Monarch Pass, (4) intersections on U.S. Highway 50 within 5 miles of  
42 Cañon City, (5) the intersection of U.S. Highways 191 and 491 in Monticello, (6) steep, curved  
43 sections of State Highways 46 and 90 east of La Sal, and (7) the 18-mile section of  
44 U.S. Highway 191 immediately south of Monticello.

46 Several perennial water sources occur along the haul routes. The San Miguel River parallels  
47 State Highway 141 from Uravan to Naturita, and the Dolores River parallels the highway for

several miles from its confluence with the San Miguel River to Gateway. State Highway 90 crosses the Dolores River at Bedrock.

The San Miguel River parallels State Highway 145 between Norwood and Placerville. The Uncompahgre River parallels U.S. Highway 550 between Ridgway and Montrose, and Ridgway Reservoir parallels the highway for several miles north of Ridgway. Approximately 20 miles of U.S. Highway 50 parallels the Blue Mesa Reservoir between Montrose and Gunnison. The Arkansas River parallels U.S. Highway 50 for approximately 50 miles between Salida and Cañon City.

## **4.4 Land Use**

Land uses on and around the lease tracts include mining, oil and gas exploration and production, timber harvesting, recreation, agriculture, and grazing. All land uses are subject to valid existing rights, which may be conveyed by title, deed, right-of-way, permit, withdrawal, or any other legally recognized instrument. DOE and BLM administer the lands within the lease tract boundaries.

Lands adjacent to and access roads through the lease tracts provide the public with multiple use opportunities. Sections of the more active lease tracts, such as lease tracts in the Paradox Valley group, have been substantially mined and are restricted from public access by means of locked gates. Other tracts are not fenced and remain open for other surface and subsurface uses. BLM has permitted access to the DOE lease tracts through BLM lands by granting rights-of-way for roads, utilities, and other surface uses such as grazing. BLM also has granted permits to allow leaseholders to use public lands adjacent to the lease tracts for activities associated with lease operations.

The public uses many of the unimproved roads on and around the lease tracts for recreational activities such as off-highway vehicles and hunting. Local residents use these roads for grazing and general ranching. In addition, roads around and near some of the lease tracts are receiving more use because of increased mineral and oil and gas exploration and development.

### **4.4.1 Mining**

Considerable mineral exploration and development has occurred historically in the lease tract areas. Mined minerals have included coal, oil and gas, sand and gravel, radium, uranium, and vanadium. Uranium and vanadium mining and oil and gas exploration and development are the predominant mineral activities in the lease tract areas.

Uranium and vanadium mineralization occurs in the Burro Canyon, Morrison, Entrada, and Chinle Formations within the Uravan Mineral Belt, which extends from Gateway to Slick Rock, Colorado. BLM has estimated that approximately 66,000 unpatented mining claims existed historically in the vicinity of the DOE lease tracts, the majority of which exist in areas of known or suspected uranium and vanadium mineralization (BLM 1984). In 2005, BLM processed more than 2,300 new claims for uranium mining throughout Colorado. BLM estimates that as of May 2006 there were approximately 3,500 uranium claims in San Miguel, Montrose, and Mesa Counties, not including the DOE lease tracts. Whether the claims on BLM lands are active or inactive is not known. BLM also estimates that approximately 95 percent of Colorado's mined

uranium comes from public lands, excluding the DOE lease tracts. The DOE lease tracts have produced approximately 6.75 million pounds of uranium and 34.2 million pounds of vanadium since 1975. Very little production occurred on DOE's lease tracts during the 1990s. As the price of uranium and vanadium increased during the past 2 years, the amount of minerals mined and milled also increased. During that time, mining activities were resumed on seven lease tracts.

Oil and gas production on public lands near the DOE lease tracts is concentrated in San Miguel County along the Colorado-Utah border in the Paradox Basin. Known oil and gas reserves also are located to the east and south of the Slick Rock leases. As the demand for oil and gas increases, the requests for permits on BLM lands increases accordingly.

#### **4.4.2 Recreation**

The vast majority of BLM lands near the DOE lease tracts are accessible to the public for off-highway vehicle use, mountain biking, hiking, hunting, and other recreational uses. In the vicinity of the DOE lease tracts, BLM has categorized public lands into two types of recreational management areas: Special Recreation Management Areas (SRMAs) and Extensive Recreation Management Areas (ERMAs). SRMAs are areas where recreation is recognized as the principal land-use management objective. ERMAs are areas where recreation is not the principal objective, but it is considered along with other uses under a multiple land-use management objective and, as such, ERMAs receive only custodial care.

The Dolores River Canyon is the only SRMA that is near any of the DOE lease tracts. It extends from McPhee Reservoir north of the town of Dolores 104 miles north to the town of Bedrock. Portions of DOE lease tracts 13, 13A, and 14 lie within the Dolores River Canyon SRMA. Although there are several mining operations (both currently permitted and historic) on these lease tracts, none of the currently permitted operations are being actively mined at this time. This SRMA includes one of the more popular rafting and canoeing rivers in the southwestern United States. The BLM and the U.S. Forest Service have constructed recreational sites along this SRMA. The peak period for river activity is from April 30 to June 15 during spring runoff. All other BLM lands surrounding the lease tracts are managed as ERMAs. See also Sections 4.13, "Wilderness," and Section 4.15, "Wild and Scenic Rivers."

The Gateway area and surrounding Unaweep Canyon have recently become the focus of targeted development. It is the intent of a private land owner to promote the area as a destination resort and encourage recreational activities in the area. BLM is currently in the process of conducting inventories of recreational resources to determine if an SRMA designation is warranted. As the resort and community are further developed, it is recognized that additional tourism and traffic would result. To date, no studies have been conducted nor have projections been made to identify the magnitude of the increased activity.

#### **4.4.3 Timber Harvesting**

Commercial forests, such as those made up of ponderosa pine, Douglas fir, and Engelmann spruce, are very limited in the lease tract areas because of minimal rainfall, steep topography, and relatively low elevations. However, lease tracts and adjoining public lands provide piñon pine and juniper trees for harvesting as firewood and fence posts.

#### 4.4.4 Agriculture and Grazing

No prime or unique farmlands as defined in 7 CFR 657, exist on the DOE lease tracts. The lease tracts provide minimal forage for domestic livestock and do not support concentrated grazing. As reported in the 1995 EA (DOE 1995), BLM has determined that, in the areas of the DOE lease tracts, 30 to 50 acres of forage compose one animal unit month (AUM). Nearly all the lease tracts are within areas designated by BLM as Livestock Management Areas.

#### 4.5 Air Quality

Under the Prevention of Significant Deterioration (PSD) doctrine, EPA has adopted three standards/classifications for ambient air quality: Class I standards are intended to preserve the quality of areas with pristine air quality (most restrictive); Class II permits moderate air quality deterioration, and Class III (the least restrictive) sets an absolute limit beyond which degradation is not allowed and is designed to set standards that are protective of human health. The DOE lease tracts are designated as a PSD Class II attainment area by EPA and the State of Colorado. The baseline ambient air quality on the lease tracts meets all federal air-quality standards.

#### 4.6 Ground Water

All the lease tracts are considered to be in the alluvial Dolores River Basin, which overlies a substantial portion of the sedimentary Paradox Basin (CGS 2003). The Dolores River Basin is about 95 miles long and covers about 5,300 square miles in Montezuma, Dolores, San Miguel, Montrose, and Mesa Counties. Locally, alluvial ground water is used for domestic water, stock water, and minor irrigation (CGS 2003).

The alluvium is composed of typical Quaternary deposits of gravel, sand, silts, clays, and various mixtures of these. The mean depth of alluvial wells is 66 ft. The alluvial aquifer is capable of yielding only low to moderate quantities of water. More than 90 percent of recorded wells yield less than 50 gallons per minute, and the average yield is only 22 gallons per minute (CGS 2003).

Ground water in the Dolores Basin alluvium has concentrations of sulfate and total dissolved solids (TDS) that often exceed EPA's secondary drinking water standards established in 40 CFR 143.3 of 250 milligrams per liter (mg/L) and 500 mg/L, respectively. Discharge from the underlying Paradox Basin salt formations is thought to be the source of this lower quality water (CGS 2003). Studies by the U. S. Geological Survey have shown that the Dolores River significantly increases in TDS content as it flows through the Paradox Valley near Bedrock, Colorado (Chafin 2003).

Most bedrock wells in the area are completed in the Mesozoic Navajo Sandstone Formation. No known ground water supplies are developed in the lower Paleozoic aquifers because of their depth and high salinity. Ground water concentrations of TDS, chloride, and sulfate generally increase with depth in bedrock units. Sulfate and TDS concentrations in ground water of the Dakota Sandstone, Burro Canyon, and Morrison Formations (which overlie the Navajo Sandstone) exceed EPA secondary drinking water standards. Water from shallower portions of the Navajo Sandstone (less than 500 ft below ground surface) meets drinking water standards and is the most frequently targeted unit for potable water in the area (CGS 2003). Water from deeper portions of the Navajo Sandstone tends to be highly saline.

1  
2 No significant ground water resources are known or expected to occur on the Gateway or Uravan  
3 lease tracts. A very small amount of water was encountered in the Brushy Basin Member of the  
4 Morrison Formation during construction of the original decline at lease tract 18 on Spring Creek  
5 Mesa near Uravan, but other than the mine at that lease tract, the area mines were dry.

6  
7 For the Paradox lease tracts, some ground water has been encountered in the some of the lease  
8 tract mines located in the Monogram Mesa area. During periods of inactivity, this water has  
9 accumulated in the lower reaches of various mine workings; however, during periods of normal  
10 mining operations, the presence and impacts of water in these mines has been contained and  
11 controlled. In many instances, the water encountered is used for drilling activities and dust  
12 suppression. Ground water encountered in the underground mines on lease tracts 7 and 9  
13 prompted the leaseholder to permit and install separate mine-water treatment systems for each  
14 mine. At lease tract 7, leaseholder personnel consider the ground water to be perched (personal  
15 communication, 2006). The water has elevated concentrations of radionuclides, TDS, and  
16 sulfate. This elevated radioactivity is attributed to the presence of uranium ore and uranium  
17 decay series radionuclides in the sandstone beds of the Salt Wash Member of the Morrison  
18 Formation. The high levels of TDS and sulfate suggest that local ground water does not receive  
19 any appreciable recharge from precipitation (Cotter Corporation 1979). At lease tract 9,  
20 leaseholder personnel indicate that the source of the ground water is probably the interface of the  
21 alluvium and bedrock and that the water is entering the mine workings via exploratory boreholes  
22 from the surface (White 2006). In addition, one seep occurs in the Brushy Basin Member of the  
23 Morrison Formation, and traces of water are found perched above clays in scours found in the  
24 Salt Wash Member of the Morrison Formation.

25  
26 No significant ground water resources are known or expected to occur on the Slick Rock lease  
27 tracts with the exception of lease tract 13. Mines on this lease tract contain workings that lie  
28 downdip of and below the Dolores River. These workings contain water in their lower reaches;  
29 but the presence and impacts of water in these mines was contained and controlled during the  
30 most recent operation of the mines. As noted previously, in many instances, the water  
31 encountered is used for drilling activities and dust suppression.

## 32 33 **4.7 Surface Water** 34

35 In 1976, sections of the Dolores River downstream from McPhee Dam were evaluated for wild  
36 and scenic river status and were recommended for inclusion into the Wild and Scenic Rivers  
37 System. However, Congress did not take any designation action, and the proposed withdrawal  
38 associated with the river corridor expired in 1981 (BLM 1984).

39  
40 The Dolores River Canyon contains unique ecosystems and historic and geologic features and is  
41 advertised nationally as a popular rafting destination that provides the solitude sought by rafters.  
42 The 1985 Resource Management Plan (BLM 1985) for the San Juan-San Miguel Resource Area  
43 included protection for the river under the BLM Special Recreation Management Area  
44 designation. BLM continues to manage the Dolores River for recreational opportunities and as a  
45 designated wild and scenic river, even though it does not have federal status as such.

1 BLM also manages sections of the San Miguel River for wild and scenic values, although it also  
2 does not carry federal status.

3  
4 The major rivers in the Uravan lease tract area are the Dolores River and its largest tributary, the  
5 San Miguel River. Neither river is contiguous with these lease tracts. Only ephemeral streams,  
6 which flow in response to precipitation events, occur on the lease tracts. These ephemeral  
7 drainages may contribute flow to the Dolores and San Miguel Rivers during precipitation events.

8  
9 Both the Dolores and San Miguel Rivers have large seasonal fluctuations in flow, with high  
10 runoff in spring and low flow after midsummer. The flow of the Dolores River is regulated by  
11 McPhee Dam and upstream irrigation diversions. The average flow of the San Miguel River at  
12 Uravan, 4 miles above the confluence with the Dolores River, is estimated at 107,500 acre-feet  
13 annually (U.S. Bureau of Reclamation 1978).

14  
15 The water quality of the rivers varies considerably on a seasonal basis because of fluctuations in  
16 runoff and in the volume of brine ground water entering the Dolores River as it passes through  
17 Paradox Valley. From 1971 to 1976, concentrations of TDS in water samples collected from the  
18 Dolores River just above the confluence with the San Miguel River were greater than  
19 12,000 mg/L; the primary constituents included bicarbonate, calcium, chloride, magnesium,  
20 potassium, sodium, and sulfate (U.S. Bureau of Reclamation 1978). Below the confluence,  
21 salinity of the Dolores River decreases considerably during periods of low flow because of the  
22 inflow of comparatively fresh water from the San Miguel River.

23  
24 The surface water system in the area of Paradox Valley lease tracts consists of several ephemeral  
25 streams that flow only during wet periods of the year and after unusually heavy rains. Runoff  
26 from the local watershed along the northeast flank of Monogram Mesa drains toward East  
27 Paradox Creek and also recharges the alluvial aquifer within Paradox Valley. Surface runoff in  
28 the Long Park plateau area flows to the northeast in existing drainages toward the San Miguel  
29 River. Surface water originating from lease tract 9, on the southwestern edge of Monogram  
30 Mesa, flows into tributaries of Bull Canyon, as does runoff from lease tracts 17 and 17A on  
31 Radium and Wedding Bell Mountains. Because of the semiarid conditions in the Paradox Valley  
32 area, significant surface water flows in ephemeral streams do not occur, and it is unlikely that  
33 flow from an ephemeral stream ever reaches an active stream.

34  
35 Paradox Valley lease tracts 7 and 9 have mine-water treatment systems (ponds) to receive  
36 discharge water from the underground mines. These ponds were constructed in accordance with  
37 applicable regulations. Those regulations required that the ponds be adequately lined, fenced,  
38 and possibly netted to ensure that wildlife and livestock and the environment are not adversely  
39 affected. Water from these treatment systems is discharged to the environment in accordance  
40 with a state water discharge permit and National Pollutant Discharge Elimination System  
41 requirements.

42  
43 The only significant surface water source in the vicinity of the Slick Rock lease tracts is the  
44 Dolores River, which is contiguous with lease tracts 13, 13A, and 14. The flow of the Dolores  
45 River in this area is regulated primarily by McPhee Dam, located approximately 46 miles  
46 upstream. Flow also is affected by numerous upstream irrigation diversions. Several upstream  
47 tributaries, including Disappointment Creek, contribute high volumes of snowmelt runoff to the  
48 Dolores River during late spring, resulting in maximum flow rates that can exceed 5,500 cubic

1 feet per second (Jacobs Engineering Group Inc. 1994). The lease tracts have numerous  
2 ephemeral drainages that may contribute flow to the Dolores River during summer  
3 thunderstorms and spring snowmelt.  
4

5 In the area of the Slick Rock lease tracts, the Dolores River has been classified as suitable for  
6 domestic water supply and agricultural purposes by CDPHE; however, withdrawals of water  
7 from the river for these purposes are minimal. In addition, CDPHE has rated the Dolores River  
8 as Class 1 for recreational waters (e.g., suitable for rafting) and as Class 1 for cold-water aquatic  
9 life in some portions downstream of McPhee Dam (CDPHE 2002).  
10

11 The Dolores River is the only significant surface water body near the Gateway lease tracts; the  
12 river is not contiguous with the lease areas. Only ephemeral streams, which flow in response to  
13 precipitation events, occur on the lease tracts and contribute flow to the Dolores River.  
14

## 15 **4.8 Soils**

16

17 Lease-specific soils information is available from the BLM Grand Junction, Uncompahgre, and  
18 San Juan Field Offices. In general, soils throughout the four DOE lease tract areas vary in  
19 relation to the underlying bedrock types. Soils on the tops of mesas underlain by sandstones are  
20 sandy and loamy; those on mesa side slopes underlain by shale, mudstones, and sandstones vary  
21 from sandy to clayey; and those along floodplains are sandy and silty. The potential for wind and  
22 water erosion of soils on mesa tops and floodplains is moderate; however, the potential for soil  
23 erosion on mesa side slopes is severe.  
24

25 BLM designates the side slopes in Paradox Valley as Erosion Management Areas because of  
26 their inherently high erosion rates (BLM 1984). All the Paradox Valley lease tracts are within or  
27 border these areas, with the exception of lease tracts 17 and 17A. No Erosion Management Areas  
28 are identified in the Gateway, Uravan, or Slick Rock lease tract areas.  
29

## 30 **4.9 Vegetation**

31

32 Sagebrush-grass and piñon-juniper plant communities dominate the terrain throughout the lease  
33 tract areas. Table B–1 in Appendix B lists the common and scientific names of plants that occur  
34 on or near the lease tracts. Higher elevations support species associated with the sagebrush-grass  
35 and piñon-juniper plant communities, such as single-leaf ash, fringed sagebrush, Utah  
36 serviceberry, mountain mahogany, antelope bitterbrush, mormon tea, forestiera, Gambel's oak,  
37 skunkbush sumac, grassy rockgoldenrod, needle and thread, slender wheatgrass, and saline  
38 wildrye. Lower elevations and drier sites support species such as fourwing saltbush, winterfat,  
39 bud sagebrush, saltbush, hairy goldenaster, milkvetch, hairspine pricklypear, greasewood,  
40 skeletonplant, buckwheat, Spanish bayonet, Colorado four o'clock, scarlet globemallow,  
41 primrose, Indian ricegrass, galleta grass, blue grama, alkali sacaton, Sandberg bluegrass,  
42 bottlebrush squirreltail, sand dropseed, and western wheatgrass. Lease tracts 8, 23, 23A, and 23B  
43 have moister microclimates (niches where water is more abundant) and accommodate ponderosa  
44 pines.  
45

46 Cryptobiotic soil crusts, which consist of cyanobacteria, lichens, and mosses, are an important  
47 component of the cold desert ecosystems of the Colorado Plateau. These crusts enhance soil  
48 stability, reduce water runoff, increase soil nutrient content, and enhance seed germination and

1 the establishment of plants (Belnap 1992). Although the lease tracts have not been surveyed for  
2 cryptobiotic soil crusts, undisturbed areas throughout the lease tract areas are expected to support  
3 extensive cryptobiotic growth.

4  
5 In disturbed areas, rubber rabbitbrush, green rabbitbrush, broom snakeweed, and curlycup  
6 gumweed abound; however, native species such as fourwing saltbush, big sagebrush, piñon, and  
7 Utah juniper are increasing in some of these areas. Many unreclaimed sites support weedy  
8 species, such as common sunflower, prickly lettuce, tall tumblemustard, curly dock, foxtail  
9 barley, and Colorado state noxious weeds, including cheatgrass, redstem stork's bill, herb sophia,  
10 halogeton, common kochia, Russian thistle, and saltcedar. Three "top ten" noxious weeds (as  
11 defined by the State of Colorado)—Russian knapweed, hoary cress, and field bindweed—are  
12 found throughout the area.

13  
14 Two Paradox Valley lease tracts (7 and 9) have small areas of vegetation that are characteristic  
15 of a wetlands ecosystem. Discharge water from containment ponds supports vegetation that  
16 includes broadleaf cattails, Fremont cottonwoods, saltcedar, foxtail barley, annual rabbitsfoot  
17 grass, and reed canarygrass.

18  
19 The Dolores River flows through Slick Rock lease tracts 13, 13A, and 14, and Calamity Creek  
20 flows across and between Gateway lease tracts 26 and 27. Although vegetation surveys have not  
21 been conducted in areas adjacent to these waterways, it is expected that these areas contain  
22 willows, saltcedar, and Russian olive. Stands of Fremont cottonwood and associated riparian and  
23 wetland vegetation also are likely to occur.

24  
25 Threatened and endangered plant species are not known to exist on any of the lease tracts, but  
26 Uinta Basin hookless cactus, a federally listed threatened species, could potentially occur. Nine  
27 sensitive plant species could also potentially occur on the lease tracts. BLM-listed sensitive  
28 species include the kachina daisy, Paradox breadroot, Paradox lupine, Grand Junction milkvetch,  
29 Dolores River skeletonplant, Naturita milkvetch, San Rafael milkvetch, Eastwood monkey  
30 flower, and sandstone milkvetch. There are known occurrences of and known habitat for Naturita  
31 milkvetch and Dolores River skeletonplant on lease tract 13. The Forest Service lists helleborine  
32 and Wetherill's milkvetch as sensitive. On most of the lease tracts, sensitive species are unlikely  
33 to occur because the microhabitats that support these species are not known to exist. However,  
34 Paradox lupine is known to occur very near the lease tracts in the Paradox Valley and near  
35 Uravan. Known populations of Naturita milkvetch have been found near the Paradox valley lease  
36 tracts and may also occur near Uravan. San Rafael milkvetch occurs very near the Uravan lease  
37 tracts. Table 4–5 presents a summary of listed plant species in the lease tract areas.

38  
39 The Colorado Natural Heritage Program has identified Potential Conservation Areas (PCAs),  
40 which represent a best estimate of the primary area supporting the long-term survival of  
41 threatened/endangered and sensitive plant and animal species. PCAs are also designed to protect  
42 good condition or rare plant communities or rare or unique animal species occurrences. Although  
43 state regulations do not protect the habitats in a PCA, the federal and state-listed species that  
44 occur within a PCA are protected by federal and state laws. Active lease tracts that overlap PCAs  
45 include undisturbed portions of lease tracts 13 and 13A along the Dolores River. The expanded  
46 acreage of active lease tract 18 also overlaps a PCA. Inactive lease tracts with PCA overlap  
47 include tracts 14, 14A, 16, 16A, 19A (expanded acreage only), 20, and 24.



Table 4–5. Federal and State Listed, Endangered, Threatened, and Sensitive Plant Species Potentially Occurring on Lease Tracts

Common Name	Scientific Name	Status <sup>a</sup>	Occurrence on Lease Tracts
Dolores River skeletonplant	<i>Lygodesmia doloresensis</i>	Sensitive (B)	Known occurrences of habitat for this species on lease tract 13. Could potentially occur on other tracts.
Eastwood monkeyflower	<i>Mimulus eastwoodiae</i>	Sensitive (B)	Could potentially occur.
Grand Junction milkvetch	<i>Astragalus linifolius</i>	Sensitive (B)	Could potentially occur.
Helleborine	<i>Epipactis gigantea</i>	Sensitive (U)	Could potentially occur.
Kachina daisy	<i>Erigeron kachinensis</i>	Sensitive (B)	Could potentially occur.
Naturita milkvetch	<i>Astragalus naturitensis</i>	Sensitive (B)	Known occurrences of and habitat for this species on lease tract 13 near Paradox Valley lease tracts and near Uravan.
Paradox breadroot	<i>Pediomelum aromaticum</i>	Sensitive (B)	Could potentially occur.
Paradox lupine	<i>Lupinus crassus</i>	Sensitive (B)	Occurs near Paradox Valley lease tracts and near Uravan.
San Rafael milkvetch	<i>Astragalus raphaelensis</i>	Sensitive (B)	Occurs very near Uravan lease tracts.
Sandstone milkvetch	<i>Astragalus sesquiflorus</i>	Sensitive (B)	Could potentially occur.
Uinta Basin hookless cactus	<i>Sclerocactus glaucus</i>	Threatened (F)	Not known to occur on any lease tracts but potentially could.
Wetherill's milkvetch	<i>Astragalus wetherillii</i>	Sensitive (U)	Could potentially occur.

<sup>a</sup>F = federally listed

B = BLM sensitive species

U = U.S. Forest Service sensitive species

## 4.10 Wildlife

Wildlife expected to inhabit the lease tracts is typical of that found in the Colorado Plateau region. Table B–2 in Appendix B lists the species that are likely to inhabit the lease tracts. General information on wildlife in the region is published in the *San Juan/San Miguel Resource Management Plan* (BLM 1984) and the *Mesa Creek Coordinated Resource Management Plan* (BLM 1993).

Table 4–6 lists threatened, endangered, and sensitive wildlife species (including candidate species) that could occur within Mesa, Montrose, and San Miguel Counties (Colorado Natural Heritage Database 2005). The table also describes the potential for occurrence on the lease tracts.

There is no designated critical habitat for endangered species within the program area. However, critical habitat does exist for threatened and endangered fish downstream from the program area.

Other species that occur on the lease tracts are also of concern because their habitat could be affected by uranium-mining activities. These species include mule deer, elk, pronghorn antelope, desert bighorn sheep, several species of bats, and migratory birds.

**Mule Deer and Elk**—All lease tracts contain habitat that is used as winter range for mule deer and elk. As reported in DOE's 1995 EA (DOE 1995), several of the lease tracts occur within important mule deer winter habitat. Atkinson and Spring Creek Mesas (lease tracts 18, 19, 19A, and 20) are one of the primary big game wintering areas for the west side of the Uncompahgre Plateau. Other major wintering areas include Disappointment Valley (lease tracts 13, 13A, and 14), Paradox Valley (lease tracts 21, 22A, and 23A), and Monogram Mesa (lease tracts 5, 6, 7, 7A, 8, and 9). Disappointment Valley, which includes lease tracts 13, 13A, and 14, is a major winter concentration area for elk populations. Although critical range does not occur on Calamity

and Outlaw Mesas, access to the lease tracts may pass through critical range immediately to the north and south of the mesas for both deer and elk.

*Table 4–6. Federal- and State-Listed Threatened, Endangered, and Sensitive Wildlife Species Potentially Occurring on Lease Tracts*

Category	Common Name	Scientific Name	Status <sup>a</sup>	Occurrence on Lease Tracts
Birds	Bald eagle	<i>Haliaeetus leucocephalus</i>	Threatened (F,S)	Bald eagles winter in riparian habitat along the Dolores River and in Dry Creek Basin. A winter nocturnal roost area is located in Disappointment Valley. Eagles probably forage for carrion in deer and elk winter-concentration areas such as Atkinson Mesa (lease tracts 18, 19, 19A and 20), Disappointment Valley (lease tracts 13, 13A, and 14), Paradox Valley (lease tracts 21, 22A, and 23A), Monogram Mesa (lease tracts 5, 6, 7, 7A, 8, and 9), and Calamity Mesa (lease tracts 26, 26A, 27, and 27A).
	Gunnison sage grouse	<i>Centrocercus minimus</i>	Candidate (S) Sensitive (B,U)	Gunnison sage grouse potentially occur within Mesa, Montrose, or San Juan Counties. Occupied habitat for this species overlaps with the western portion of lease tract 9.
	Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Candidate (F) Sensitive (B, U)	This species inhabits cottonwood-dominated riparian areas. There is a small chance they may occupy cottonwood-dominated stretches of the Dolores River on or near lease tracts.
	Northern goshawk	<i>Accipiter gentiles</i>	Sensitive (B,U)	Calamity and Outlaw Mesas may be a foraging area for this species, but nesting does not occur in the area.
	Peregrine falcon	<i>Falco peregrinus</i>	Candidate (S) Sensitive (U)	Peregrine falcons nest close to Paradox Valley lease tracts.
	Burrowing owl	<i>Athene cunicularia</i>	Threatened (S) Sensitive (U)	This species may occur in association with prairie dog towns on or near the Gateway tracts (26, 26A, 27, and 27A).
	Ferruginous hawk	<i>Buteo regalis</i>	Candidate (S) Sensitive (B,U)	This species may use portions of the lease tracts during winter migration.
Mammals	Black-footed ferret	<i>Mustela nigripes</i>	Endangered (F, S)	Black-footed ferrets could, but are not known to, occur on some of the lease tracts that support prairie dog towns. The lease tracts have not been surveyed for prairie dog towns that might meet criteria for ferret habitat.
	Townsend's big-eared bat	<i>Plecotus townsendii</i>	Candidate (S), Sensitive (B, U)	This species is known to use uranium mines in Colorado and may occur on any of the lease tracts.
	Spotted bat	<i>Euderma maculatum</i>	Sensitive (B, U)	This species is known to use uranium mines in Colorado. Spotted bats are likely to occur on lease tracts that contain sandstone cliffs and outcroppings. Because they are crevice-roosters rather than cave-roosters, it is unlikely that they would occupy any of the mines, but they could use other habitat on the tracts.
	Fringed myotis	<i>Myotis thysanodes</i>	Sensitive (B)	This species is known to use uranium mines in Colorado and may occur on any of the lease tracts.

Table 4–6 (continued). Federal- and State-Listed Threatened, Endangered, and Sensitive Wildlife Species Potentially Occurring on Lease Tracts

Category	Common Name	Scientific Name	Status <sup>a</sup>	Occurrence on Lease Tracts
Fish	Colorado pikeminnow	<i>Ptychocheilus lucius</i>	Endangered (F) Threatened (S)	The Colorado pikeminnow does not occur on any of the lease tracts; however, it could inhabit downstream areas, including the Dolores River, which flows through lease tracts 13A, 13, and 14.
	Razorback sucker	<i>Xyrauchen texanus</i>	Endangered (F, S)	The razorback sucker does not occur on any of the lease tracts; however, it could inhabit the Colorado River downstream from the Dolores River, which flows through lease tracts 13A, 13, and 14.
	Humpback chub	<i>Gila cypha</i>	Endangered (F) Threatened (S)	The humpback chub does not occur on any of the lease tracts; however, it could inhabit the Colorado River downstream from the Dolores River, which flows through lease tracts 13A, 13, and 14.
	Bonytail	<i>Gila elegans</i>	Endangered (F, S)	The bonytail does not occur on any of the lease tracts; however, it could inhabit the Colorado River downstream from the Dolores River, which flows through lease tracts 13A, 13, and 14.
	Roundtail chub	<i>Gila robusta</i>	Candidate (S) Sensitive (B, U)	The roundtail chub does not occur on any of the lease tracts; however, it could inhabit downstream areas, including the Dolores River, which flows through lease tracts 13A, 13, and 14.
	Flannelmouth sucker	<i>Catostomas latipinnis</i>	Sensitive (B, U)	The flannelmouth sucker does not occur on any of the lease tracts; however, it could inhabit downstream areas, including the Dolores River, which flows through lease tracts 13A, 13, and 14.
Reptiles and Amphibians	Midget faded rattlesnake	<i>Crotalus oreganus concolor</i>	Candidate (S) Sensitive (B)	This species would be expected to inhabit abandoned mines and structures in the area of the lease tracts. The range and status of this species is currently under discussion.
	Leopard lizard	<i>Gambelina wislizenii</i>	Candidate (S) Sensitive (B)	This species may occur in semi-desert areas on or near lease tracts.
	Leopard frog	<i>Rana pipiens</i>	Candidate (S) Sensitive (B, U)	This species is associated with wetland types that do not occur on the lease tracts.

<sup>a</sup>F = federally listed, S = state listed, B = BLM sensitive species, U = U.S. Forest Service sensitive species

**Pronghorn Antelope**—A small band of pronghorn antelope remains in the Dry Creek Basin and Disappointment Valley areas after reintroduction efforts by the CDOW. These animals could occur on lease tracts 13, 13A, and 14.

**Desert Bighorn Sheep**—The CDOW has successfully reintroduced desert bighorn sheep along the Dolores River near Slick Rock. Lease tracts 13, 13A, and 14 are likely to be visited by these sheep. CDOW occupied habitat mapping for this species includes some areas in the east and west Paradox Valley, and down the Dolores River well into Mesa County. There is some potential for this species to be present at least on occasion on lease tracts 19, 19A, 20, and the cliffs on the north side of Paradox Valley between lease tracts 7 and 8 and 22 and 23.

1  
2 **Bats**—Lease tracts 5, 6, 7, 9, 11, 13, 13A, 15, 18, 26, 26A, 27, and 27A have mine shafts, adits,  
3 and inclines/declines that could provide roosting habitat for bats. Some of the DOE reclaimed  
4 sites already have bat gate closures to protect important bat habitat. No bats are federally listed  
5 as threatened or endangered, but sensitive species (listed in Table 4–6) are likely to occur on  
6 some of the lease tracts. As reported in the 1995 EA (DOE 1995), CDOW and BLM personnel  
7 have observed those species listed in Table 4–6, along with the long-eared myotis, long-legged  
8 myotis, small-footed myotis, and California myotis in abandoned uranium mines in Colorado.  
9 DOE has worked closely with BLM experts in this area and is aware of bat use at some of the  
10 mine workings on its lease tracts. There are no known maternity roosts on any DOE lease tracts,  
11 but state-listed species are known to use some mines in summer and winter. Because of the  
12 sensitive nature of these species, DOE and BLM are maintaining these data as confidential and  
13 will not identify specific sites in this EA. However, DOE and BLM will use this information in  
14 the future to mitigate bat impacts if actions are proposed on lease tracts used by bats.  
15

16 **Migratory Birds**—Neotropical migratory birds depend on continuous and healthy riparian  
17 vegetation for migration corridors and nesting habitats. Several of these species (including the  
18 lazuli bunting and several species of warblers, vireos, and flycatchers) are expected to occur on  
19 or near the lease tracts that support riparian vegetation. The southwestern willow flycatcher, a  
20 federally listed endangered species, is unlikely to occur on or near the lease tracts.  
21

22 Three “birds of conservation concern” listed by USFWS may occur in the Calamity Mesa area:  
23 the black-throated gray warbler, Virginia’s warbler that occurs in mountain shrub communities,  
24 and the piñon jay. Birds of conservation concern that may occur on or near the lease tracts in  
25 Montrose and San Miguel Counties include the peregrine falcon, piñon jay, prairie falcon, sage  
26 sparrow, short-eared owl, Swainson’s hawk, yellow-billed cuckoo (also a federal candidate  
27 species), black-throated gray warbler, ferruginous hawk, grey vireo, golden eagle, Lewis’  
28 woodpecker, and northern harrier. Many species of migratory birds inhabit the piñon-juniper  
29 forests and other communities on all the lease tracts. Most of these birds actively nest for  
30 approximately 2 months (from mid-May to mid-July), but some nesting activities can begin as  
31 early as January and continue through the summer. Golden eagles, with an extended nesting  
32 period, nest close to the lease tracts in the Paradox Valley and near the Uravan tracts. Piñon jays  
33 nest from mid-March to mid-May.  
34

## 35 **4.11 Cultural Resources**

36

37 Ten thousand to 12,000 years of human use or occupation in western Colorado’s plateau country  
38 has been documented (BLM 1984). Evidence of the earliest people, the big-game (mammoth)  
39 hunters of the Paleo-Indian tradition (10,000 to 5500 B.C.), is rarely encountered in the region.  
40 The presence of the Paleo-Indian in western Colorado is inferred from archaeological finds of  
41 distinctive projectile-point styles associated with the Llano or Clovis complex (dated between  
42 10,000 and 9000 B.C.) and the Folsom complex (dated between 9000 and 7000 B.C.) and from  
43 finds of projectile points and lithic sites associated with the Plano complex (dated between  
44 7000 and 5500 B.C.) (Chandler et al. 1990).  
45

46 Around 5500 B.C., the moderation of climatic conditions forced a change in human subsistence.  
47 The emphasis on big-game hunting gave way to the exploitation of a greater variety of animal  
48 and plant foodstuffs and the emergence of what is known as the Archaic tradition. The Archaic

1 tradition is well represented in western Colorado. Diagnostic projectile points include large-  
2 stemmed and indented base, lanceolate, and large side- and corner-notched varieties. Other  
3 artifacts commonly found on Archaic sites are one-hand manos and slab metates. Radiocarbon  
4 data suggest three periods of this tradition: Early Archaic (5550 to 3550 B.C.), Middle Archaic  
5 (3500 to 2050 B.C.), and Late Archaic (2050 B.C. to A.D. 450) (Chandler et al. 1990).

6  
7 The Archaic tradition was succeeded by the Formative stage (A.D. 1 to 1300), which is marked  
8 by the introduction of horticulture, the construction of more advanced dwellings, and the  
9 fabrication of ceramics. Two contemporaneous cultures are associated with the Formative stage  
10 in western Colorado: the Fremont in the northwest and the Ancestral Puebloans (Anasazi) in the  
11 southwest. However, little evidence exists that west-central Colorado was dominated by either  
12 culture; rather, the area may have been occupied by both cultures *and* by an indigenous people  
13 who adopted cultural elements from both the Fremont and Ancestral Puebloans but whose  
14 hunting and gathering lifestyle remained more like that of their Archaic predecessors  
15 (Chandler et al. 1990).

16  
17 Occupation of western Colorado during the several hundred years before colonial and subsequent  
18 European settlement was intermittent and seasonal. Ute tribe hunters and gatherers were the  
19 primary land users (BLM 1984). With the introduction of the horse in the mid-17th century, the  
20 lifestyle of the Ute Tribe became increasingly dependent upon raiding and upon hunting bison on  
21 the plains. Ute occupation is evidenced by extensive tool-production areas, hunting camps, and  
22 processing areas. Specifically associated with the Ute occupation of west-central Colorado are  
23 Uncompahgre Brownware ceramics, desert side-notched and Cottonwood triangular projectile  
24 points, and wickiups (brush shelters) (Chandler et al. 1990).

25  
26 Spanish explorers arrived in the area in the 18th century. The Escalante-Dominguez Expedition  
27 of 1776 is the best known of the explorations. After the removal of the Utes to reservations in the  
28 1880s, west-central Colorado was opened to Euro-American settlement. Mining, ranching,  
29 agriculture, oil and gas development, and recreation and tourism have formed the economic base  
30 of the area for more than a century. Of interest to the present study is that, as early as the 1880s,  
31 settlers were drawn to the area, particularly to the Paradox and Gypsum Valleys, by the presence  
32 of uranium ore (from which radium was extracted for medical purposes). The towns of Bedrock,  
33 Nucla, and Naturita owe their prosperity primarily to the construction of uranium-ore processing  
34 plants.

35  
36 The Gateway and Uravan lease tracts are near or overlap areas of known prehistoric occupation  
37 as well as areas of early Euro-American settlement and ranching. The Paradox Valley and Slick  
38 Rock lease tracts also are located in areas of demonstrated prehistoric occupation, particularly  
39 those tracts near the Dolores River Canyon. Many of the lease tracts contain structures and  
40 artifacts associated with the early uranium mining boom in the United States; some of these  
41 features are considered historic and eligible for inclusion in the National Register of Historic  
42 Places.

43  
44 An overall archaeological site density of 17 sites per square mile is reported in BLM's *San*  
45 *Juan/San Miguel Resource Management Plan and Environmental Impact Statement*  
46 (BLM 1984). However, site density in the BLM planning area varies greatly; an inventory of  
47 Mockingbird Mesa (south of the Slick Rock lease tracts) yielded more than 100 sites per square  
48 mile, the majority of which have been recommended for inclusion in the National Register of

1 Historic Places. On the Paradox Valley area lease tracts, BLM has estimated an average density  
2 of 13 sites per square mile. Two well-known cultural sites are present near lease tract 9: the Bull  
3 Canyon rock-shelter, a prehistoric site, and Indian Henry's Cabin, a late 19th century site  
4 containing a well-preserved log cabin, corral, and gravesite.

5  
6 All the 13 existing leases were subjected to cultural resource field surveys and clearances before  
7 receiving DOE's authorization to proceed. Historic mining operations on the 25 additional lease  
8 tracts under review may have had some level of field surveys and resource clearances prior to  
9 previous mining efforts, but because the location of future workings is currently unknown, the  
10 applicability of past surveys is also unknown at this time.

11  
12 Near the Gateway lease tracts, numerous sites associated with historical uranium mining are  
13 present. Of these, Calamity Camp is probably the most significant. Located on the lease tract, it  
14 encompasses approximately 23 stone and wood structures, many of them constructed prior to  
15 1922. This camp was occupied first by radium miners (mining carnotite) from the early 1900s  
16 through the early 1920s and later by vanadium and uranium miners through the 1960s. This  
17 camp and others on Outlaw and Calamity Mesas, notably Foster Camp, Climax Camp, and  
18 Arrowhead Camp, served as community centers for miners and their families during the  
19 vanadium and uranium booms in southwest Colorado. BLM has determined that Calamity Camp  
20 is eligible for inclusion in the National Register of Historic Places and the camp is expected to be  
21 listed on the National Register by 2007 (Laforge 2006). To protect the structures and features  
22 associated with this camp, BLM and DOE agreed to a "No Surface Occupancy" area that  
23 includes and surrounds the camp. No cleanup or remediation work has or will take place within  
24 this area, and no remediation or disturbance is allowed within a 30-meter buffer zone  
25 surrounding the camp boundary.

## 26 27 **4.12 Visual Resources**

28  
29 Visual resources are the visible physical features of a landscape that impart scenic value. BLM  
30 has described the areas surrounding the lease tracts as having diverse and spectacular scenery. In  
31 general, they are characterized by broad to narrow river valleys, steep canyons, mesas, rolling  
32 parks, mountains, and ridges (BLM 1984, 1985).

33  
34 The Gateway lease tracts are remotely located on the tops and side slopes of piñon pine- and  
35 juniper-covered mesas. They are not visible from State Highway 141, which is located  
36 approximately 3 to 4 miles west of the lease tracts and is the nearest paved roadway. The  
37 segment of State Highway 141 traversing the Gateway lease tracts area is part of the  
38 Unaweep/Tabeguache Scenic and Historic Byway. BLM has designated the byway corridor as an  
39 area with high visual resource management importance. The lease tracts are accessed by county  
40 and unimproved roads. BLM has not assigned specific visual resource classification or protection  
41 status to these lease tracts (Laub 2005).

42  
43 The Uravan lease tracts are either adjacent to or near the Unaweep/Tabeguache Scenic and  
44 Historic Byway (State Highway 141). The majority of these lease tracts are not visible from the  
45 byway and would not be affected by this designation. This area is characterized by deep-cut  
46 valleys and contrasting red rock formations. No specific visual resource protection status has  
47 been assigned to the lease tracts (BLM 1984).

1 The Paradox Valley lease tracts are located on side slopes and ridges adjacent to a wide valley  
2 floor and generally are not readily visible from State Highway 90, which provides primary  
3 access to the area. Access from State Highway 90 to the lease tracts is provided by gravel,  
4 seasonal, and four-wheel-drive roads. Primary users of this lease tract area include hunters,  
5 grazing permittees, and four-wheel-drive enthusiasts. These areas typically are not considered  
6 visual area destinations, although the visual features have considerable merit. The lease tract 7  
7 open-pit mine is visible from State Highway 90, as are other non-DOE mining activities. BLM  
8 has not assigned a specific visual resource protection status to the Paradox Valley lease tracts  
9 (BLM 1984). The Dolores River Canyon Wilderness Study Area is approximately 1 mile  
10 northwest of lease tracts 17 and 17A and 1 mile northwest of lease tract 8. BLM manages actions  
11 within the study area under Visual Resource Management Class I. Under a Class I designation,  
12 changes to the visual landscape should be very low and must not attract attention.

14 The Slick Rock lease tracts are traversed by or located adjacent to State Highway 141, near the  
15 former community of Slick Rock. State Highway 141 in this area is not part of the  
16 Unaweep/Tabeguache Scenic and Historic Byway. The area surrounding the Slick Rock lease  
17 tracts is subject to heavy non-DOE mining activities that are visible from the highway. DOE  
18 lease tract activity also is readily visible from the highway. Visible signs of activity primarily  
19 consist of roads and mine-waste-rock piles that have naturally revegetated.

21 BLM manages actions on these lease tracts under Visual Resource Management Class III  
22 (Wu 2005). Under a Class III designation, changes to the visual landscape from new activities  
23 must, at a minimum, partially retain the existing character of the landscape. The level of change  
24 to the landscape should be moderate at most; management activities may attract attention but  
25 should not dominate the view of the casual observer. Portions of lease tracts 13, 13A, and 14  
26 straddle the Dolores River Canyon SRMA. BLM manages actions within these sections of the  
27 SRMA under Visual Resource Management Class II. Under a Class II designation, BLM  
28 attempts to retain the existing character of the landscape; any changes should have a low visual  
29 impact. Presently, numerous mine workings on lease tracts 13 and 13A and on BLM-  
30 administered lands are readily visible from the river corridor.

32 Portions of the potential ore truck-haul routes (Figure 3-2) have been designated as Colorado  
33 Scenic and Historic Byways. State Highway 141 between Whitewater and Placerville, Colorado,  
34 is designated as the Unaweep/Tabeguache Scenic and Historic Byway. State Highway 62  
35 between Placerville and Ridgeway, Colorado, is part of the San Juan Skyway Scenic and Historic  
36 Byway. A 28-mile segment of U.S. Highway 50 immediately west of Gunnison is part of the  
37 West Elk Loop Scenic and Historic Byway, and a 9-mile segment of U.S. Highway 50  
38 immediately west of Cañon City is part of the Gold Belt Tour Scenic and Historic Byway.

#### 40 **4.13 Wilderness Areas**

42 No designated Wilderness Areas are located near the DOE lease tracts. However, BLM has  
43 managed a portion of the Dolores River Canyon as a Wilderness Study Area since 1984. Lease  
44 tracts 17 and 17A in the Paradox lease tract area are approximately 1 mile southeast of the study  
45 area boundary and lease tract 8, also in the Paradox lease tract area, is approximately 1 mile  
46 southeast of the study area boundary.

## 4.14 Noise

Noise is technically defined as sound waves that are unwanted and perceived as a nuisance by humans. Sound waves are characterized by frequency and measured in hertz (Hz); sound pressure is expressed as decibels (dB). Humans have a perceptible hearing range of 31 to 20,000 Hz. The threshold of audibility ranges from about 60 dB at a frequency of 31 Hz to less than about 1 dB between 900 and 8,000 Hz. For regulatory purposes, noise levels for perceptible frequencies are weighted to provide an A-weighted sound level [dBA] that correlates highly with individual community response to noise. Sound pressure levels outside the range of human hearing are not considered noise in a regulatory sense, even though wildlife may be able to hear at those frequencies. A better understanding of noise impacts is facilitated by associating noise levels with common activities or sources (Figure 4–5).

Noise levels are often reported as the equivalent sound level ( $L_{eq}$ ). The  $L_{eq}$  is expressed in an A-weighted sound level over a specified period of time, usually 1 or 24 hours. The  $L_{eq}$  is the equivalent steady sound level that, if continuous during a specified time period, would contain the same total energy as the actual time-varying sound over the monitored or modeled time period. Another expression of noise levels is the day-night sound level ( $L_{dn}$ ). This is the average of the day and nighttime A-weighted sound level with a built-in penalty of 10 dB at night. The  $L_{dn}$  is particularly useful for evaluating community-level noise effects.

The uranium lease tracts are located in a quiet, open sagebrush-grass and piñon-juniper plant communities where natural phenomena such as wind, rain, and wildlife account for most natural background sounds. At times, insect activity and birds may account for significant portions of environmental sounds. Sources of man-made background noise near the lease tracts may include automobile and truck traffic, aircraft flying overhead, and limited outdoor recreational activities in adjacent areas.

### Noise Measurement

#### What are *sound* and *noise*?

When an object vibrates it possesses energy, some of which transfers to the air, causing the air molecules to vibrate. The disturbance in the air travels to the eardrum, causing it to vibrate at the same frequency. The ear and brain translate the vibration of the eardrum to what we call *sound*. *Noise* is simply unwanted sound.

#### How is sound measured?

The human ear responds to sound pressures over an extremely wide range of values. The range of sounds people normally experience extends from low to high pressures by a factor of 1 million. Accordingly, scientists have devised a special scale to measure sound. The term decibel (abbreviated dB), borrowed from electrical engineering, is the unit commonly used.

Another common sound measurement is the A-weighted sound level, denoted as dBA. The A-weighting accounts for the fact that the human ear responds more effectively to some frequencies than others. Higher frequencies receive less weighting than lower ones. Most of the sound levels provided in this report are A-weighted; however, some are in decibels because of lack of information on the frequency spectrum of the sound. Figure 4–5 shows common references to sound on the A-weighted sound-level scale.



Sound Source	Sound Level (dBA)	Response
Carrier deck jet operation	140	
Civil defense siren (at 100 ft)	130	Painfully loud
Jet takeoff (at 200 ft)	120	Threshold of feeling and pain
Riveting machine (at 1 ft)	110	
Ambulance siren (at 100 ft)	100	Very loud
Heavy truck (at 50 ft)	90	
Freight train cars (at 50 ft)	80	
Vacuum cleaner (at 10 ft)	70	Moderately loud
Air conditioning unit (at 20 ft)	60	
Speech in normal voice (at 15 ft)	50	
Residence, no TV or radio	40	Quiet
Soft whisper (at 5 ft)	30	
Recording studio	20	
	10	
	0	Threshold of hearing

Figure 4–5. Comparison of A-Weighted Sound Pressure Levels Associated With Different Sources of Noise

The cities and towns in the region are located beyond the influence of noise originating at any lease tract. Typical noise levels in and around cities and towns of the region likely range from 45 to 55 dBA and have levels approaching 65 dBA around busy roads. If noise is regulated, municipalities often have a noise ordinance specifying that evening noise levels not exceed 65 dBA. If regulated, this evening noise restriction typically specifies hours and locations, such as residential zones from 10:00 p.m. to 7:00 a.m. Monday through Saturday and not before 9:00 a.m. on Sunday, and commercial zones from 10:00 p.m. to 6:00 a.m. the following day. The acoustic environment in southwestern Colorado is typical of other desert environments where average  $L_{dn}$  values range from 22 dB on calm days to 38 dB on windy days (Brattstrom and Bondello 1983).

## 4.15 Wild and Scenic Rivers

In 1976, sections of the Dolores River downstream from McPhee Dam, including the section near Slick Rock that passes through lease tracts 13, 13A, and 14, were evaluated for Wild and Scenic River status and recommended for inclusion into the Wild and Scenic Rivers System. However, Congress did not take any designation action, and the proposed withdrawal associated with the river corridor expired in 1981 (BLM 1984).

The Dolores River Canyon contains unique ecosystems and historic and geologic features and provides the solitude sought by rafters. The segment of the river just downriver from Bradfield Bridge and McPhee Reservoir to the Dolores River Wilderness Study Area is advertised nationally as a popular rafting destination. This stretch may be completed as a single trip or divided into two 3-day trips. The 1985 Resource Management Plan for the San Juan-San Miguel Resource Area included protection for the river under the BLM Special Recreation Management Area designation. BLM continues to manage the Dolores River for recreational opportunities and as a designated Wild and Scenic River, even though it does not have federal status as such. As of June 12, 2006, BLM is completing a draft plan amendment to the 1985 Resource Management Plan that will provide additional protection of resources.

BLM also manages sections of the San Miguel River for wild and scenic values, although it also does not carry federal status.

## 4.16 Floodplains and Wetlands

Portions of Slick Rock lease tracts 13, 13A, and 14 are located within the 100-year floodplain of the Dolores River. Calamity Creek flows across and between Gateway lease tracts 26 and 27. Classified as a perennial stream, it occasionally becomes intermittent in the vicinity of the lease tracts during drought years. Although vegetation surveys have not been conducted on these tracts, the floodplains adjacent to the waterways likely contain riparian and wetland-type vegetation (e.g., willow, Fremont cottonwood, reed canarygrass, forestiera, and sedges). Historically, preoperational and operational activities have not occurred on the Dolores River floodplain.

Vegetation characteristic of wetland ecosystems appears on lease tracts 7, 9, and 14. These areas on lease tracts 7 and 9 are formed by mine dewatering operations (mine water is pumped to containment ponds); the potential wetland areas on lease tract 14 are formed by storm-water accumulation in small, shallow, surface mines. The total area encompassed by these areas ranges from 2 to 10 acres.

## 4.17 Human Health

Mine sites on the DOE lease tracts comprise rocks and soils that contain naturally occurring radioactive material; most of the natural radioactivity is derived from the uranium-238 and uranium-235 decay chains. One of the products in the uranium-238 decay chain is radium-226, which is the principal radionuclide of concern for characterizing the distribution of radioactivity in the environment.

Background levels of radium-226 are normally present in soil in trace concentrations of about 1 picocurie per gram (pCi/g); however, background concentrations within ore-bearing formations may be as high as hundreds of thousands of picocuries per gram. Background concentrations of radium-226 in mine-waste-rock piles average 23.7 pCi/g (EPA 1991). In the DOE lease tracts, the concentration of radium-226 in mine-waste-rock piles is about 110 pCi/g. The primary radioactive sources on the DOE lease tracts are mine-waste-rock piles, mine portals, ore-bearing outcrops (Salt Wash Member of the Morrison Formation), and airborne particulates derived from these sources. In underground mines, the primary radium-226 source is the ore-bearing Salt Wash Member.

Nationwide, people are exposed to an average of about 300 mrem/yr of natural background radiation (NCRP 1987). Table 4–7 presents a summary of radiation doses from natural background for the nation and representative doses for the region containing the uranium lease tracts.

*Table 4–7. United States and DOE Uranium Lease Tract Natural Background Radiation Doses*

Source	U.S. Average Natural Background Radiation Dose (millirem/yr)	Uranium Lease Tract Natural Background Radiation Dose (millirem/yr)
Cosmic and cosmogenic radioactivity	28	68
Terrestrial radioactivity	28	74
Internal radioactivity	40	40
Inhaled radioactivity	200	260
Rounded Total	300	440

The largest natural source is inhaled radioactivity, mostly from radon-222 and its radioactive decay products in homes and buildings, which accounts for about 200 mrem/yr. Additional natural sources include radioactive material in soils (primarily external radiation from the uranium and thorium decay series), radioactive material in the body (primarily potassium-40), and cosmic rays from space filtered by the atmosphere.

The actual radiation dose from natural background radiation varies with location. The radiation dose from cosmic and cosmogenic radioactivity is about 68 mrem/yr in the region containing DOE's lease tracts (based on data for Blanding, Utah); the dose from external terrestrial radioactivity is about 74 mrem/yr; and the dose from radon-222 and its radioactive decay products is about 260 mrem/yr (IUC 2003). The total natural background radiation dose in the region around DOE's lease tracts is about 440 mrem/yr, which is higher than the national average.

#### 4.18 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 7629), directs federal agencies to identify and address, as appropriate, any activities that may affect minority and low-income populations. A minority has been defined as individuals who are members of the following population groups: American Indian or Alaska Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population has been identified where the minority population of the

affected area exceeds 50 percent of the population. Low-income populations are groups with an annual income below the poverty threshold. Because only a few lease tracts have any residents within several miles and because of the remoteness of the lease tracts, no minority or low-income populations live within miles of any lease tract.

Table 4–8 presents a summary of the distribution of minority populations throughout the lease tract counties and adjacent counties. With the exception of San Juan County, Utah, where American Indians represent more than half the population, and Mesa, Montrose, and Fremont Counties, where Hispanics and Latinos represent more than 10 percent of the population, minorities are a small percentage of the population within the region.

*Table 4–8. Minority Populations in the Lease Tract Counties and Adjacent Counties<sup>a</sup>*

Population Group	Minorities as a Percentage of the Population						
	Mesa	Montrose	San Miguel	Dolores	Ouray	Freemont	San Juan, Utah
White	87.0	82.4	90.4	92.8	93.2	81.1	39.6
Black or African American	0.5	0.3	0.3	0.1	0.1	5.3	0.1
American Indian or Alaska Native	0.9	1.0	0.8	2.0	0.9	1.5	55.7
Asian or Pacific Islander	0.6	0.5	0.8	0.5	0.4	0.6	0.2
Hispanic or Latino (of any race)	10.0	14.9	6.7	3.9	4.1	10.3	3.7
Total Population	127,253	36,674	7,116	1,788	4,139	47,425	14,015

<sup>a</sup>U.S. Census Bureau (2004). (totals are not exactly 100% because of other minority mixes).

Table 4–9 presents a summary of the distribution of low-income families and individuals throughout the lease tract counties and adjacent counties based on the 2000 census. The poverty level established by the U.S. Census Bureau for 2000 for a family of four with two children below the age of 18 was \$17,463, and the poverty level for an individual was \$8,794.

*Table 4–9. Low-Income Population in the Uranium Lease Tract Counties and Adjacent Counties*

State	County	Families Below Poverty Level <sup>a</sup> (%)	Individuals Below Poverty Level <sup>c</sup> (%)
Colorado <sup>b</sup>		6.2	9.3
	Mesa	7.0	10.2
	Montrose	8.9	12.6
	San Miguel	6.6	10.4
	Dolores	10.2	13.1
	Ouray	6.0	7.2
	Freemont	8.3	11.7
Utah <sup>b</sup>		6.5	9.4
	San Juan	26.9	31.4

Sources

<sup>a</sup>U.S. Census Bureau (2004).

<sup>b</sup>CDLE 2005.

<sup>c</sup>Utah Department of Workforce Services (2005).

End of current text

## 5.0 Environmental Impacts

This section characterizes the environmental impacts that could occur under the Expanded Program, the Existing Program, and the No Action alternatives characterized in Section 3. The discussion first assesses impacts by technical disciplines such as socioeconomics, surface water and ground water, and terrestrial and aquatic biota. The section concludes with a comparison of impacts among the alternatives (Section 5.20) and a discussion of cumulative impacts (Section 5.21) that might occur within the region when DOE's actions are added to other reasonably foreseeable activities planned or ongoing in the region.

As discussed in Section 1, because this EA is programmatic, impacts are assessed on a more regional basis as opposed to lease-tract-specific analyses. However, to support DOE's programmatic decision-making, Section 5.20 includes a brief assessment by lease tract of the potential for mining development to affect sensitive environmental features. Should DOE decide to proceed with the ULP, as has been the practice in the past, DOE would review all activities proposed by the leaseholders in accordance with the two-tiered review process described in Section 3.5.

### 5.1 Socioeconomics

#### 5.1.1 Expanded Program Alternative

Under the Expanded Program alternative, the leaseholders could conduct preoperational, operational, and postoperational activities at a level exceeding that of the last decade. If the market were to allow a resumption of uranium and vanadium production on all 38 lease tracts, up to 570 direct jobs could be created. The local economies of communities in Mesa, Montrose, San Miguel, Fremont, and San Juan Counties would be beneficially affected by an increase in the number of jobs and by increases in local wages and secondary wages, and by an increase in tax base. Surrounding counties would also feel the positive economic effects of this increased labor force. Because these jobs would be spread over a large geographic region, no single county or municipality would be burdened with large increases in demands on infrastructure such as schools, police and fire protection, or utilities.

As shown in Table 4-2, housing vacancies exist in all counties in the region. Should uranium mining expand to include all 38 lease tracts and be sustained, a decrease in vacancy rates would be expected over the long term. The increase in jobs could increase housing construction in the smaller communities near the lease tracts and in Cañon City, Blanding, and White Mesa near the ore-processing mills. In the short term, however, due to the limited availability of temporary housing in the towns nearest the lease tracts, temporary housing capacity could be exceeded, necessitating longer commuting distances for some workers, which would result in increased traffic from commuting workers.

#### 5.1.2 Existing Program Alternative

Under the Existing Program alternative, the leaseholders would conduct preoperational, operational, and postoperational activities at a levels similar those occurring in 2005. Assuming all 13 leases were brought into production, up to 186 direct jobs could be created. The local economies of communities in Mesa, Montrose, San Miguel, Fremont, and San Juan Counties

1 would be beneficially affected by an increase in the number of jobs and by increases in local  
2 wages and secondary wages. Surrounding counties would also feel the positive economic effects  
3 of this increased labor force. Because these jobs would be spread over a large geographic region,  
4 no single county or municipality would be burdened with large increases in demands on  
5 infrastructure such as schools, police and fire protection, or utilities.

6  
7 As shown in Table 4–2, housing vacancies exist in all counties in the region. Should uranium  
8 mining occur on all 13 lease tracts and be sustained, a decrease in vacancy rates would be  
9 expected over the long term. The increase in jobs could increase housing construction in the  
10 smaller communities near the lease tracts and in Cañon City, Blanding, and White Mesa near the  
11 ore-processing mills. In the short term, however, due to the limited availability of temporary  
12 housing in the towns nearest the lease tracts, temporary housing capacity could be exceeded,  
13 necessitating longer commuting distances for some workers.

### 14 15 **5.1.3 No Action Alternative**

16 Under the No Action alternative, all existing long-term mining-related jobs would then be  
17 terminated. Approximately 60 short-term jobs would exist during the reclamation activities when  
18 current leases expire. Many of these jobs would be filled with the existing leaseholder workforce.  
19 Reclamation activities would most likely be completed within 1 to 2 years of initiation. The loss  
20 of current mining-related jobs and of up to 60 short-term jobs would have minor adverse impacts  
21 on the overall economies of the four counties.

## 22 23 **5.2 Transportation**

### 24 25 **5.2.1 Expanded Program Alternative**

26 All ore shipments must be conducted in accordance with applicable Colorado and Utah  
27 Department of Transportation regulations, which require that specific shipping documents be  
28 prepared for each shipment and then accompany the shipment to its destination. The regulations  
29 also mandate that all shipments be tarped.

30  
31 Under the Expanded Program alternative, an average of 120 haul trucks and a maximum of  
32 150 haul trucks (or truck-and-pup combinations) per day (one way) would transport uranium and  
33 vanadium ore to the processing mill near Cañon City, Colorado, or to the mill near Blanding and  
34 White Mesa, Utah. Although it is likely that under this full-scale production assumption both  
35 mills would be operating, and therefore some percentage of the shipments would go to each mill,  
36 it is possible that only one mill might be receiving ore at a given time. Therefore, the analyses  
37 conservatively assume shipping of all 150 shipments to each mill (300 one-way trips per day).  
38 However, the traffic impacts as projected in Table 5–1 could not simultaneously occur on the  
39 routes to both mills. This section assesses the impacts of ore shipments in terms of increases in  
40 haul-truck numbers, the effect of those increases on traffic congestion, the radiological impacts  
41 on workers and the public from the shipments, and the projected accident rates that would result  
42 from the Expanded Program alternative. Other potential impacts from the projected increase in  
43 haul-truck traffic (i.e., noise levels, visual aesthetics, dust generation, and truck/animal  
44 accidents) are discussed in subsequent sections.

Table 5–1 presents statistics regarding projected traffic increases for road segments along the potential haul routes (see Figure 3–2 for potential routes). Shipments were apportioned to each highway segment based on the number of lease tracts that might use each segment. As shipments from multiple lease tracts accumulate along any given haul route, and as highway segments merge, the number of shipments along that haul route increases proportionally until the maximum number of haul trucks (150 rounds trips per day) is reached. Statistical data are provided in Table 5–1 that project the effects of up to 150 haul trucks per day making round trips from the lease tracts to the mills as percent increases in the number of trucks and in total traffic. Analyses are also provided in Table 5–1 that assess the current capacity of these routes and the effect that the additional haul trucks would have on congestion.

From a pure vehicle number perspective, even though some of the percent increases in traffic are large in Table 5–1, under the maximum shipping scenario, 150 haul trucks making one round trip would result in an average of 37.5 haul trucks per hour, or 1 every 1.6 minutes along some route segments. However, under the Expanded Program alternative, in no case would the increase in total traffic (under the worst case—all shipments to a single mill) exceed 10 percent through populated areas. In fact, most populated areas would see less than a 5 percent increase in total traffic. For the highest percent traffic increase, 85 percent in sparsely populated Segment D, a resident who now sees and hears one vehicle every 2 minutes would see one every minute, depending on proximity to the highway.

From a congestion perspective, Table 5–1 provides the current estimated ratios of volume to capacity for each segment and the effect that the Expanded Program alternative would have on this ratio as a measure of congestion. As a result of the Expanded Program alternative, additional haul trucks would be added to several routes in the states of Colorado and Utah. The additional traffic has the potential to cause traffic congestion on some of the route segments. The common method of estimating the potential for congestion is to perform a Level of Service (LOS) evaluation on the route segments. The LOS for a route segment is an alphabetic letter, A through F, which measures the amount of congestion on the route. A route designated as LOS A through LOS C would be experience essentially no congestion. Maneuvering is easily accomplished. With LOS D the average speed begins to decline, maneuvering is difficult, and breakdowns could easily occur. A segment operating at LOS E has no usable gaps in the traffic stream for maneuvering, any disruption results in breakdown of the traffic stream. With LOS F, there is always a traffic queue. Appendix N of the Highway Performance Management System Field Manual, presents a procedure for estimating the highway capacity for service flow rates for LOS E (FHA 2005). Under these guidelines, for any given highway segment, if the ratio of the vehicle volume to capacity (the  $v/c$  ratio) is greater than 1.0, that segment is considered congested.

Table 5–1 shows the current  $v/c$  ratio for each route segment and the recalculated value based on the additional heavy truck traffic that would result from the Expanded Program alternative. It can be seen from the values in the last two columns on Table 5–1 that no segments have a  $v/c$  ratio greater than 1.0 even after the ratio has been recalculated to account for the increased heavy truck traffic associated with the Expanded Program alternative. Thus, under the Federal Highway evaluation system, the additional traffic resulting from this alternative would not result in congestion along any of the routes that might be used. Even segment D, which would receive the highest percent increase in traffic numbers, would not become congested because the projected volume would be very low compared to that segment's capacity. There are two route segments where the  $v/c$  ratio is close to 1.0.



Table 5–1. Transportation Statistics for Haul Route Segments—Expanded Program Alternative

Figure 3–2 Map Symbol	Location Description	AADT <sup>a</sup>	No. Trucks	Increased Number of Trucks	% Trucks	% Increase Total Traffic	% Increase Trucks	Current Capacity Ratio	Expanded Alternative Capacity Ratio
AA	On US-191 at Crescent Junction and I-70	2,770	1,025	33	37	1.2	3.9	0.44	0.45
BB	US-191 & entrance to Arches NP	6,573	1,840	33	28	1.2	3.9	0.77	0.78
CC	US-191 and Central Moab	14,764	4,282	33	29	0.2	5.1	0.81	0.81
A	US-191 and Monticello	6,905	1,105	300	16	9.6	68.9	0.31	0.34
B	US-191 and SR-95, 4 mi south of Blanding	1,892	435	300	23	4.0	57.5	0.20	0.25
DD	On I-70, just east of US-191	6,472	2,848	33	44	0.5	3.1	0.19	0.19
C	SH-491 at Colo/Utah state line	2,100	630	300	30	14.3	47.6	0.02	0.02
D	SH-90 west of CR 575 to Paradox	240	43	204	17.8	85.0	477.5	0.02	0.04
E	SH-90 0.25 mi south of SH-141, Vancorum	430	54	126	12.6	29.3	232.6	0.05	0.07
EE	I-70 west of Mack interchange	6,800	1,768	33	26	0.5	1.9	0.15	0.15
FF	I-70 SW of SH-6 & SH-70, west of GJ	13,700	2,439	33	17.8	0.2	1.4	0.25	0.25
F	SH-141 0.25 mi north of SH-491	580	73	300	12.6	51.7	410.5	0.02	0.04
G	SH-141 0.8 mi south of SH-145	540	170	204	31.4	37.8	120.3	0.07	0.10
H	SH-141 0.25 mi west of SH-90, Vancorum	340	41	79	12.1	23.2	192.0	0.21	0.33
GG	SH-141 NE of NE jct. CR-SX.90, Gateway	670	101	33	15	4.9	32.8	0.03	0.03
HH	SH-141 0.3 mi west of US-50, Whitewater	1,300	359	33	27.6	2.5	9.2	0.08	0.08
I	SH-145 0.25 mi east of SH-141	1,300	160	300	12.3	23.1	187.6	0.38	0.60
J	SH-145 east of Market St., Norwood	3,100	214	300	6.9	9.7	140.3	0.21	0.28
K	SH-145 0.25 mi NW of SH-62, Placerville	1,900	296	300	15.6	15.8	101.2	0.13	0.18
L	SH-62 0.25 mi NE of SH-145, Placerville	3,800	369	300	9.7	7.9	81.4	0.51	0.64
M	SH-62 west of US-550, Ridgway	7,900	474	300	6	3.8	63.3	0.66	0.76
N	US-550 0.6 mi north of SH-62, Ridgway	7,100	582	300	8.2	4.2	51.5	0.55	0.63
O	US-550 south of US-50 & SH-90, Montrose	23,600	1,180	300	5	1.3	25.4	0.75	0.79
II	US-50, south of Nolan Ave., GJ	34,000	1,224	33	3.6	0.1	2.7	0.98	0.98
JJ	US-50 NW of SH-141, Whitewater	9,300	335	33	3.6	0.4	9.9	0.33	0.34

Table 5-1 (continued). Transportation Statistics for Haul Route Segments—Expanded Program Alternative

Figure 3-2 Map Symbol	Location Description	AADT <sup>a</sup>	No. Trucks	Increased Number of Trucks	% Trucks	% Increase Total Traffic	% Increase Trucks	Current Capacity Ratio	Expanded Alternative Capacity Ratio
KK	US-50 @ Gunnison River Bridge	10,400	863	33	8.3	0.3	3.8	0.27	0.27
LL	US-50 south of SH-92, Delta	21,500	1,312	33	6.1	0.2	2.5	0.47	0.47
MM	US-50 south of SH-348, Olathe	12,700	762	33	6	0.3	4.3	0.52	0.53
P	US-50 east of SH-90 & SH-550, Montrose	16,200	1,393	300	8.6	1.9	21.5	0.60	0.64
G	US-50 0.8 mi east of SH-92, Blue Mesa Dam	2,600	354	300	13.6	11.5	84.8	0.23	0.30
R	US-50 east of SH-149	4,100	549	300	13.4	7.3	54.6	0.51	0.61
S	US-50 west of SH-135, Main St., Gunnison	12,500	1,425	300	11.4	2.4	21.1	0.90	0.97
T	US-50 0.8 mi west of SH-114	3,100	363	300	11.7	9.7	82.7	0.57	0.73
U	US-50 east of CR-229, east of Monarch Pass	2,700	640	300	23.7	11.1	46.9	0.38	0.45
V	US-50 west of N. Jct. US-285, Poncha Spgs	3,600	824	300	22.9	8.3	36.4	0.65	0.75
W	US-50 east of G & 16 St., Salida	11,200	1,008	300	9	2.7	29.8	0.55	0.60
X	US-50 west of CR-45, Coaldale	3,000	231	300	7.7	10.0	129.9	0.47	0.64
Y	US-50 east of SH-69, Texas Creek	3,100	484	300	15.6	9.7	62.0	0.37	0.46
Z	US-50 west of 1st St., Cañon City	8,200	886	300	10.8	3.7	33.9	0.61	0.68

<sup>a</sup>AADT = annual average daily traffic (CDOT 2003, UDOT 2004).

U.S. = U.S. Highway    mi = mile    CR = County Road    SR = State Road    SH = State Highway

These are a 2-mile section of US-50 in Grand Junction, Colorado (segment II), and a 1-mile section of US-50 in Gunnison, Colorado (segment S). However, even with the addition of trucks under the Expanded Program alternative the ratio would not exceed 1.0.

From an accident perspective, under the maximum shipping scenario, 150 haul trucks per day traveling to Cañon City (the longest of the three routes, a distance of 320 miles each way) 264 days per year (22 days per month), would travel a maximum of 25.3 million miles in 1 year. Given the rate of 0.015 fatalities per million vehicle miles (CDOT 2000), approximately 0.38 deaths per year could be expected to occur from haul-truck accidents; given the rate of 0.63 injuries per million vehicle miles, approximately 16 injuries per year could be expected to occur from haul-truck accidents.

Residents who live along county roads near some of the lease tracts do not routinely experience truck traffic. Specifically, occupants of the 15 residences along the county roads that would be used to transport ore from the lease tracts to the state highways might experience noise or dust from passing haul trucks and increased traffic. This increased traffic could also increase the likelihood of accidents. DOE would work with federal, state, and local agencies and the leaseholders, as appropriate, to mitigate any increase in accident rates. Mitigation could include measures such as additional signage, speed restrictions, and if deemed appropriate, limitations on haul-truck numbers. Occupants of 14 of the 15 residences could have seen uranium ore

shipments over the last 10 years from DOE lease tracts. The actual noise and dust impacts would vary among residences with their distance from the county or BLM roads and whether the road surface is gravel or blacktop. Table 5–2 identifies the lease tracts with nearby residences and the specific lease tracts that could make ore shipments that would pass these residences. Assuming that 4 shipments per lease tract would occur during an 8-hour workday (based on historical haul rates), the single residence near lease tract 13 would have the most shipments and would have a haul-truck passing by on average every 20 minutes. If shipments were made over a 24-hour workday, a haul truck would pass this residence only once every hour. As shown on Table 5–2, shipments would pass other residences even less frequently. From a regulatory perspective, current regulations within San Miguel County limit uranium ore shipments (e.g., from Slick Rock lease tracts) to 8 haul trucks per day per mine, which is twice the average shipping rates that have occurred in the past or are anticipated to occur under the Expanded Program alternative.

*Table 5–2. Expanded Program Alternative—Trucking Impacts on County Roads*

Nearest Lease Tract	Residences Potentially Affected	Possibly Affected by Shipments from Lease Tracts	Average Number of Trucks per Day
Slick Rock - 11, 11A	8	11,11A,	8
Slick Rock - 13	1	11,11A, 13, 13A, 15, 15A	24
Slick Rock - 13A	1	11,11A,13A, 15, 15A	20
Slick Rock - 15, 15A	3	11, 11A, 15, 15A	16
Slick Rock - 16	1	10,16,	8
Gateway - 26, 26A, 27, 27A	1	26, 26A, 27, 27A	16

#### 5.2.1.1 Radiological Transportation Impacts

Under the Expanded Program alternative, an average of 120 to 150 haul trucks per day would deliver uranium ore to either the White Mesa or Cañon City uranium mill. Shipments would take place for 22 days per month 12 months per year. In one year, there would be between 31,680 and 39,600 shipments of uranium ore.

**Workers.** For shipments of uranium ore to the White Mesa or Cañon City uranium mills, the maximally exposed transportation worker would be a haul-truck driver. This person was assumed to drive a haul truck containing uranium ore for 1,000 hours per year. For the other 1,000 hours per year, the haul truck would be empty. The driver was assumed to be 10 ft from the trailer containing the uranium ore, and the radiation dose rate in the cab of the haul truck was estimated to be 0.014 mrem per hour.

This driver would receive a radiation dose of 14 mrem per year, which is equivalent to a probability of a latent cancer fatality of about  $8.4 \times 10^{-6}$ , or about 8 chances in 1 million. If the driver worked for 10 years, the probability of a latent cancer fatality would be about  $8.4 \times 10^{-5}$ , or about 8 chances in 100,000. For perspective, an individual has a lifetime probability of dying of cancer from all sources of about 220,000 in 1 million, or a risk of lung cancer of 60,000 in 1 million (SEER 2005).

**Public.** Four representative scenarios were evaluated to estimate exposures of the public to shipments containing uranium ore:

- An individual stopped in traffic next to a uranium ore truck. This individual would be exposed to one shipment of uranium ore for 30 minutes. The distance between the haul truck and the individual's vehicle was assumed to be 6.6 ft. The radiation dose rate was estimated to be 0.052 mrem per hour at 6.6 ft from the haul truck.
- An individual in a vehicle who passes a uranium ore truck going the opposite direction. This individual would be exposed to one shipment of uranium ore. The distance between the haul truck and the individual's vehicle was assumed to be 6.6 ft, and the two vehicles were assumed to be traveling at 25 miles per hour. The radiation dose rate was estimated to be 0.052 mrem per hour at 6.6 ft from the haul truck.
- An individual stopped at an intersection when a haul truck passes by. This individual would be exposed to one shipment of uranium ore. The distance between the haul truck and the individual's vehicle was assumed to be 6.6 ft, and the haul truck was assumed to be traveling at 25 miles per hour. The radiation dose rate was estimated to be 0.052 mrem per hour at 6.6 ft from the haul truck.
- A nearby resident located 33 ft from a road used by haul trucks. The haul truck was assumed to be traveling at 25 miles per hour. This individual would be exposed to all shipments of uranium ore over the course of a year. The radiation dose rate was estimated to be 0.052 mrem per hour at 6.6 ft from the haul truck.

Table 5–3 presents the impacts of the public exposure scenarios. The largest radiation dose would be for the nearby resident, who would receive a dose of 0.22 mrem per year from the passing haul trucks. This is equivalent to a probability of a latent cancer fatality of about  $1.3 \times 10^{-7}$ , or about 1 chance in 10 million. If the nearby resident was exposed to shipments for 10 years, the probability of a latent cancer fatality would be about  $1.3 \times 10^{-6}$ , or about 1 chance in 1 million. As described above, an individual has a lifetime probability of dying of cancer from all sources of about 220,000 in 1 million, or a risk of lung cancer of 60,000 in 1 million.

*Table 5–3. Radiation Doses to the Public From Shipments Under the Expanded Program Alternative*

Scenario	Radiation Dose	Latent Cancer Fatalities
Individual in traffic jam	0.026 mrem	$1.6 \times 10^{-8}$
Individual in passing vehicle	$7.4 \times 10^{-6}$ mrem	$4.4 \times 10^{-12}$
Individual in vehicle at intersection	$1.5 \times 10^{-5}$ mrem	$9.0 \times 10^{-12}$
Nearby resident	0.22 mrem per year	$1.3 \times 10^{-7}$

#### 5.2.1.2 Transportation Accidents

If a severe transportation accident occurred during shipment of uranium ore, an individual could receive exposure to radiation. Radiation doses were estimated for inhalation and direct exposure from the passing radioactive cloud, direct exposure from radioactivity deposited on the ground, and inhalation of resuspended radioactive particulates from the ground.

For this analysis, the maximally exposed individual is assumed to be located about 33 ft from the site of the accident. This individual would receive a radiation dose of 4.9 mrem, which is

equivalent to a probability of a latent cancer fatality of about  $2.9 \times 10^{-6}$ , or about 3 chances in 1 million.

If the accident occurred in a rural area, the population would receive a collective radiation dose of about  $8.4 \times 10^{-5}$  person-rem. This is equivalent to a probability of a latent cancer fatality of about  $5.0 \times 10^{-8}$ , or about 5 chances in 100 million.

If the accident occurred in a more populated area such as Moab, Grand Junction, Norwood, Ridgway, Montrose, Gunnison, Salida, or Cañon City, the population would receive a collective radiation dose of about  $9.9 \times 10^{-3}$  person-rem. This is equivalent to a probability of a latent cancer fatality of about  $5.9 \times 10^{-6}$ , or about 6 chances in 1 million.

Uranium ore is typically composed of the mineral uraninite. This mineral is not very soluble in water, so if an accident occurred where the uranium ore was dumped into a stream, it is unlikely that any radiological impacts to biota would occur. If a spill were to occur on the ground, the ore would be completely removed, loaded onto a truck, and transported to the mill. Except for soil and vegetation disturbance, impacts to natural resources are not expected to occur from a spill or spill cleanup. If the ore were spilled into a shallow surface water source, it would be removed before water quality could be adversely affected by the radiological component of the ore. Most ore would be in large enough sizes (e.g., cobbles) that it would be recovered easily from the water source. The finer particles would be dispersed by stream flow and would not create a radiological hazard to aquatic life. The primary impact to water quality from a spill would be a short-term increase in turbidity and total suspended solids.

After a spill, the radiation dose rate above the spill would be about 1 mrem per hour. The radiation dose for a first responder would be less than 5 mrem, and the radiation dose for a cleanup worker would be less than 10 mrem. These radiation doses are equivalent to a probability of a latent cancer fatality of less than  $6.0 \times 10^{-6}$ , or about 6 chances in 1 million.

Wildlife would continue to be injured or killed along the haul routes through collisions with haul trucks, and this would increase proportionately with haul-truck traffic. Typically, haul-truck drivers would not take evasive action to avoid wildlife because that action could lead to an accident involving a turnover or collision with another vehicle. Wildlife most likely to be affected would include mule deer, elk, porcupines, rabbits, prairie dogs, ground squirrels, golden eagles, coyotes, foxes, and turkey vultures.

### **5.2.2 Existing Program Alternative**

All ore shipments must be conducted in accordance with applicable Colorado and Utah Department of Transportation regulations, which require that specific shipping documents be prepared for each shipment and then accompany the shipment to its destination. The regulations also mandate that all shipments be tarped.

Under this alternative, ore from currently active lease tracts would be mined and transported for processing. Traffic increases from current conditions would be expected under the Existing Program alternative because there was little interest in mining the active lease tracts in the recent past. Table 5–4 shows traffic statistics for a maximum case of 50 haul trucks per day (see Figure 3–3 for potential routes).

Table 5-4. Transportation Statistics for Haul Route Segments—Existing Program Alternative

Figure 3-3 Map Symbol	Location Description	AADT <sup>a</sup>	No. Trucks	Increase in Trucks	% Trucks	% Increase Total Traffic	% Increase Trucks	Current Capacity Ratio	Existing Alternative Capacity Ratio
A	US-191 and Monticello	6,905	1,105	100	16	3.2	23.0	0.31	0.32
B	US-191 and SR-95, 4 mi south of Blanding	1,892	435	100	23	1.3	19.2	0.20	0.22
C	SH-491 at Colo/Utah State Line	2,100	630	100	30	4.8	15.9	0.02	0.02
D	SH-90 west of CR-575 to Paradox	240	43	54	17.8	22.5	126.4	0.02	0.03
E	SH-90 0.25 mi south of SH-141, Vancorum	430	54	38	12.6	8.8	70.1	0.04	0.05
F	SH-141 0.25 mi north of SH-491	580	73	100	12.6	17.2	136.8	0.02	0.03
G	SH-141 0.8 mi south of SH-145	540	170	54	31.4	10.0	31.8	0.07	0.08
H	SH-141 0.25 mi west of SH-90, Vancorum	340	41	15	12.1	4.4	36.5	0.21	0.24
I	SH-145 0.25 mi east of SH-141	1,300	160	100	12.3	7.7	62.5	0.38	0.46
J	SH-145 east of Market St., Norwood	3,100	214	100	6.9	3.2	46.8	0.21	0.24
K	SH-145 0.25 mi NW of SH-62, Placerville	1,900	296	100	15.6	5.3	33.7	0.13	0.15
L	SH-62 0.25 mi NE of SH-145, Placerville	3,800	369	100	9.7	2.6	27.1	0.51	0.56
M	SH-62 west of US-550, Ridgway	7,900	474	100	6	1.3	21.1	0.66	0.70
N	US-550 0.6 mi north of SH-62, Ridgway	7,100	582	100	8.2	1.4	17.2	0.55	0.58
O	US-550 south of US-50 and SH-90, Montrose	23,600	1,180	100	5	0.4	8.5	0.75	0.76
P	US-50 east of SH-90 & US-550, Montrose	16,200	1,393	100	8.6	0.6	7.2	0.60	0.61
Q	US-50 0.8 mi east of SH-92, Blue Mesa Dam	2,600	354	100	13.6	3.8	28.3	0.23	0.25
R	US-50 east of SH-149	4,100	549	100	13.4	2.4	18.2	0.51	0.55
S	US-50 west of SH-135, Main St., Gunnison	12,500	1425	100	11.4	0.8	7.0	0.90	0.92
T	US-50 0.8 mi west of SH-114	3,100	363	100	11.7	3.2	27.6	0.57	0.63
U	US-50 east of CR-229, east of Monarch Pass	2,700	640	100	23.7	3.7	15.6	0.38	0.41
V	US-50 west of N. Jct. US-285, Poncha Spgs	3,600	824	100	22.9	2.8	12.1	0.65	0.68
W	US-50 east of G & 16 St., Salida	11,200	1008	100	9	0.9	9.9	0.55	0.57
X	US-50 west of CR-45, Coaldale	3,000	231	100	7.7	3.3	43.3	0.47	0.53
Y	US-50 east of SH-69, Texas Creek	3,100	484	100	15.6	3.2	20.7	0.37	0.40
Z	US-50 west of 1st St., Cañon City	8,200	886	100	10.8	1.2	11.3	0.61	0.63

<sup>a</sup>AADT = annual average daily traffic (CDOT 2003, UDOT 2004).

U.S. = U.S. Highway    mi = mile    CR = County Road    SR = State Road    SH = State Highway

The biggest increases in traffic are predicted along Colorado State Highways 90 and 141. However, these increases would be expected to have little impact because of the low population and traffic levels currently in these areas. Additionally, as discussed in Section 5.2.1 and as shown on Table 5–4, the additional haul trucks under the Existing Program alternative would not sufficiently increase the traffic volume such that the highway capacity would be exceeded and create congestion.

Under a maximum shipping scenario, 50 haul trucks per day traveling to Cañon City (the longest of the existing routes, a distance of 320 miles each way) 264 days per year (22 days per month), would travel a maximum of 8.5 million miles in 1 year. Given the average state highway fatality rate of 0.015 per million vehicle miles (CDOT 2000), approximately 0.13 deaths per year could be expected to occur from haul-truck accidents; given the rate of 0.63 injuries per million vehicle miles, approximately 5.4 injuries per year could be expected to occur from haul-truck accidents.

Residences along the county and BLM roads and visitors would be subjected to noise, dust, and traffic impacts similar to those characterized under the Expanded Program alternative. However, as shown on Table 5–5, there would be 13 (instead of the 15 under the Expanded Program alternative) residences affected; the residence adjacent to lease tract 13 would have the most haul-truck traffic—16 haul trucks per day. All of these residences, or the lands on which new residences have been built, have had ore shipments along these county and BLM roads within the last 10 years.

*Table 5–5. Existing Alternative—Trucking Impacts on County Roads*

<b>Nearest Lease Tract</b>	<b>Residences Potentially Affected</b>	<b>Possibly Affected by Shipments from Lease Tracts</b>	<b>Average Number of Trucks per day</b>
Slick Rock - 11	8	11	4
Slick Rock - 13	1	11,13, 13A, 15,	16
Slick Rock - 13A	1	11,13A, 15	12
Slick Rock - 15	3	11, 15	8

#### 5.2.2.1 Radiological Transportation Impacts

Under the Existing Program alternative, an average of 30 to 50 haul trucks per day would deliver uranium ore to either the White Mesa or Cañon City uranium mills. Shipments would take place for 22 days per month, 12 months per year. In one year, there would be between 7,920 and 13,200 shipments of uranium ore.

A driver hauling ore from a mine to a mill would receive the same annual exposure under the Existing Program alternative as under the Expanded Program alternative characterized in Section 5.2.1, a radiation dose of 14 mrem per year, which is equivalent to a probability of a latent cancer fatality of about  $8.4 \times 10^{-6}$ , or about 8 chances in 1 million. If the driver worked for 10 years, the probability of a latent cancer fatality would be about  $8.4 \times 10^{-5}$ , or about 8 chances in 100,000.

The same public exposure scenarios assessed in Section 5.2.1 could occur under the Existing Program alternative; however, because the number of shipments would decrease, the radiation doses would also decrease. Table 5–6 presents the impacts of the public exposure scenarios described in Section 5.2.1.1. The largest radiation dose was for the nearby resident, who would receive a radiation dose of 0.074 mrem per year from the passing uranium ore trucks. This is equivalent to a probability of a latent cancer fatality of about  $4.4 \times 10^{-8}$ , or about 4 chances in 100 million. If the nearby resident was exposed to shipments for 10 years, the probability of a latent cancer fatality would be about  $4.4 \times 10^{-7}$ , or about 4 chances in 10 million. As described under the Expanded Program alternative, an individual has a lifetime probability of dying of cancer from all sources of about 220,000 in 1 million, or a risk of lung cancer of 60,000 in 1 million.

*Table 5–6. Radiation Doses for the Public From Shipments Under the Existing Program Alternative*

Scenario	Radiation Dose	Latent Cancer Fatalities
Individual in traffic jam	0.026 mrem	$1.6 \times 10^{-8}$
Individual in passing vehicle	$7.4 \times 10^{-6}$ mrem	$4.4 \times 10^{-12}$
Individual in vehicle at intersection	$1.5 \times 10^{-5}$ mrem	$9.0 \times 10^{-12}$
Nearby resident	0.074 mrem per year	$4.4 \times 10^{-8}$

#### 5.2.2.2 Transportation Accidents

The same accident scenarios and consequences that were assessed in Section 5.2.1 for the Expanded Program alternative could occur under the Existing Program alternative. Impacts to the environment are expected to be minimal from haul-truck traffic. If a spill were to occur on the ground, the ore would be completely removed, loaded onto a haul truck, and transported to the mill. Except for soil and vegetation disturbance, impacts to natural resources are not expected to occur from a spill or spill cleanup. If the ore were spilled into a shallow surface water source, it would be removed before water quality could be adversely affected by the radiological component of the ore. Most ore would be in large enough sizes (e.g., cobbles and stones) that it would be recovered easily from the water source. The finer particles would be dispersed by stream flow and would not create a radiological hazard to aquatic life. The primary impact to water quality from a spill would be a short-term increase in turbidity and total suspended solids.

Wildlife would continue to be injured or killed along the haul routes through collisions with haul trucks. Typically, haul-truck drivers would not take evasive action to avoid wildlife because that action could lead to an accident involving a turnover or collision with another vehicle. Wildlife most likely to be affected would include mule deer, elk, porcupines, rabbits, prairie dogs, ground squirrels, golden eagles, and turkey vultures.

#### 5.2.3 No Action Alternative

All ore shipments must be conducted in accordance with applicable Colorado and Utah Department of Transportation regulations, which require that specific shipping documents be prepared for each shipment and then accompany the shipment to its destination. The regulations also mandate that all shipments be tarped.



1 Some ore transportation could be conducted under this alternative. The former leaseholders  
2 would have rights to the ore that has already been mined and stockpiled on the lease tracts.  
3 Currently, less than 5,000 tons of ore are stockpiled on the lease tracts. Using 20 haul trucks per  
4 day, the leaseholders could transport the ore to the processing mills in approximately 10 days. If  
5 the haul-truck drivers were to take the longest route from the existing lease tracts to the Cañon  
6 City Mill (380 miles each way), the haul trucks would travel a maximum of 152,000 miles.  
7 Given the 2000 fatality and injury rates (CDOT 2000), approximately 0.002 fatalities and  
8 0.01 injuries could be expected to occur during transport of the ore.  
9

10 Because of this very limited potential for ore shipment under the No Action alternative, impacts  
11 to humans from radiation exposure and impacts to the environment, and the possibility of  
12 transportation accidents would be far lower than the negligible consequences predicted under the  
13 Existing Program alternative (Section 5.2.2).  
14

## 15 **5.3 Land Use**

### 16 **5.3.1 Mining**

#### 17 **5.3.1.1 Expanded Program Alternative**

18  
19 Under the Expanded Program alternative, DOE could extend the ULP to make all 38 leases  
20 available for mining. The ores would then be transported for milling and subsequent commercial  
21 use. Removing the ore would deplete known domestic reserves of uranium and vanadium;  
22 however, continued exploration could result in discovery of previously unidentified ore reserves.  
23 Further, ore removal would be beneficial to supply the marketplace with additional uranium and  
24 vanadium, which helps meet current and future needs.  
25

#### 26 **5.3.1.2 Existing Program Alternative**

27 Under the Existing Program alternative, DOE would maintain the Uranium Leasing Program at  
28 its current level, and the existing 13 leases would continue to be available for mining activity.  
29 Minor additional discovery of ore might occur.  
30

#### 31 **5.3.1.3 No Action Alternative**

32 Under the No Action alternative, DOE's leases would be allowed to expire by 2007, and the ULP  
33 would terminate. The active lease tracts would be reclaimed, and all withdrawn lands in the  
34 program would be returned to BLM jurisdiction upon approval. Future leasing under DOE's  
35 ULP would not be an option. The uranium and vanadium resources on the DOE lease tracts  
36 would not be immediately available for extraction and commercial uses while reclamation  
37 activities are completed and the process of returning jurisdiction to BLM takes place. At some  
38 point in the future, the resources would be considered locatable minerals and would be available  
39 for extraction and mineral development by private entities through BLM.  
40

## 5.3.2 Recreation

### 5.3.2.1 Expanded Program Alternative

Under the Expanded Program alternative, effects on recreational activities in the lease tract areas would be minimal even if all leases were to open up for all phases of operations. If all lease tracts were engaged in mining activities, approximately 750 acres would be unavailable for recreational use. Increases in noise, dust, traffic, and human activity in and around the lease tracts could deter recreational users from using public lands adjacent to the lease tracts; however, there are numerous unimproved roads in the vicinity of the lease tracts that allow easy access to all public lands.

Mining activities on lease tracts 13, 13A, and 14 in the Dolores River Canyon SRMA could potentially detract from the recreational experience of those using the Dolores River. Expected impacts to those recreational users would consist of noise from equipment during operational activities and fans used to vent mine operations that would be heard along the river. In addition, there would be visual degradation from the mining activities, which, however, would not be unlike other viewsheds that traversed mining areas.

The extent of the distraction would depend on the types and number of operations occurring on these tracts. Because most of the anticipated activities would be exploration and underground mining, the potential detractions would be expected to be minimal. In addition, DOE would restrict activities at these existing mine sites so that they do not further encroach on the Dolores River, and new mining activities would not be allowed within 0.25-mile of the Dolores River. Tract 2 of lease tract 14 is traversed extensively by the Dolores River and, for that reason, was specifically excluded from past leasing activities and will be excluded from such activities in the future. Activities on the lease tracts would not affect any areas used for river access or overnight camping and could be noticed or heard, along with other activities on existing roads, by river users for only a few minutes in the first mile or two downstream of the highway 141 launch site in Slick Rock.

### 5.3.2.2 Existing Program Alternative

Under the Existing Program alternative, approximately 410 acres would be unavailable for recreational use if the 13 leases in the program were in operation. The recreational use effects would be minimal because the amount of land unavailable would be negligible compared to the amount of public land available for recreational use. As described in Section 5.3.2.1, mining activities on lease tracts 13 and 13A in the Dolores River Canyon SRMA could potentially detract from the recreational experience of those using the Dolores River.

### 5.3.2.3 No Action Alternative

Cessation of mining activities on all lease tracts would have minimal impact for recreational users for most of the lease tracts because most tracts are fairly remote, although generally open for public access, and they are not designated as specific recreational areas. However, the absence of mining activities (e.g., noise, dust, traffic, and human activity) and reclamation of the land would benefit recreational users in and near some lease tracts, especially those tracts in and close to the Dolores River Canyon SRMA. Leases that are now fenced as a result of active

mining would become available for other uses such as off-highway vehicle traffic, hiking, and hunting.

### **5.3.3 Timber Harvesting**

#### **5.3.3.1 Expanded Program Alternative**

Under the Expanded Program alternative, some piñon pine and juniper trees would likely be removed as more leases become available for access roads, mine construction and development, and mine site expansion. Because of the abundance of piñon pine and juniper in the lease tract areas, impacts to these species would be minimal. For all future leaseholder activities, DOE would restrict the time period in which leaseholders can perform the bulk removal of vegetation, particularly piñon pine, to minimize the spread of the IPS beetle.

#### **5.3.3.2 Existing Program Alternative**

In the current leasing program, not all leases are currently in operation. If all 13 leases were engaged in mining activities, there would be some minimal increase in timber removal for roads and mine-related activities. For all future leaseholder activities, DOE would restrict the time period in which leaseholders can perform the bulk removal of vegetation, particularly piñon pine, to minimize the spread of the IPS beetle.

#### **5.3.3.3 No Action Alternative**

No impacts to piñon pine and juniper resources would occur under the No Action alternative.

### **5.3.4 Agriculture and Grazing**

#### **5.3.4.1 Expanded Program Alternative**

Under the Expanded Program alternative, a maximum of 9 to 15 AUMs could be lost as a result of an increase in active mining activities from the additional surface disturbance of 450 acres. This small loss in acreage would not adversely affect the volume of grazing forage in grazing allotments over the lease tracts. Additional impacts to livestock may include increased animal/vehicle accidents, damage to or increased maintenance requirements for access roads or range improvements such as cattle guards and fences, and disruption of normal livestock trailing/movement from mine development. DOE requires the leaseholders to repair damages to fences, cattle guards, and other infrastructure caused by their operations.

#### **5.3.4.2 Existing Program Alternative**

If all leases under the existing program were engaged in operations, approximately one to two additional AUMs would be lost for grazing from the additional 110 acres that could be disturbed. This would be an increase over the 6 to 10 AUMs that may have been lost to grazing from the 300 acres that are currently disturbed on the 13 existing lease tracts and associated roads. Because most mining activities occur in lands not suitable for crops, there would be no impacts to agriculture.

### 5.3.4.3 No Action Alternative

Under the No Action alternative, grazing allotments on DOE's lease tracts would be beneficially affected by the cessation of mining activities and reclamation of disturbed lands. Assuming all disturbed lands (approximately 300 acres) were reclaimed and suitable for grazing, there would be a net increase of 6 to 10 AUMs.

## 5.4 Air Quality

### 5.4.1 Expanded Program Alternative

The Expanded Program alternative would result in localized increases in fugitive dust; however, *regional* air quality would not be expected to be adversely affected by these localized increases. Localized impacts to air quality would result from fugitive dust emissions produced by surface disturbances associated with mining and truck hauling and, to a lesser extent, from engine emissions produced from on-site equipment and haul trucks.

The regulatory requirements applicable to any mining operation at any lease tract would largely depend on the size and extent of the mining operations and activities (e.g., annual production rate, production quantity over the anticipated life of the mine, amount of surface disturbances, distances traveled on haul roads). The State of Colorado Air Quality Control Commission (AQCC) regulations that have potential applicability to mining activities and operations at the uranium lease tracts include:

- Regulation 1: Particulates, Smokes, Carbon Monoxide & Sulfur Oxides
- Regulation 3: Stationary Source Permitting and Air Pollutant Emission Notice Requirements
- Regulation 8: Part A, Federal NESHAPs (National Emission Standards for Hazardous Air Pollutants); Subpart B, National Emission Standards for Radon Emissions from Underground Uranium Mines (40 CFR 61.20)

Leaseholders are responsible for identifying the regulations that apply specifically to their operations and activities and for fully complying with all permitting and other regulatory requirements that are applicable to their operations and activities.

Because fugitive dust emissions are the primary air pollutant of concern associated with these mining activities, all leaseholders would evaluate their activities and operations for compliance with the requirements for preparing and submitting an Air Pollutant Emissions Notice in accordance with AQCC Regulation 3, Section II. Where applicable, all leaseholders would develop a Fugitive Dust Control Plan and employ control measures and operating procedures, as necessary, to minimize fugitive particulate emissions into the atmosphere. AQCC Regulation 1 Section III.D requires that mining operations comply with the 20 percent opacity and no off-property transport emission limitation guidelines. The leaseholder would be required to implement control measures and operating procedures that would achieve compliance with this regulation. Some counties require a use permit to haul ore on the county roads and through that process may require a lessee to implement dust control measures on county roads.

As outlined in Part B of AQCC Regulation 3, “Concerning Construction Permits,” a Construction Permit may also be required in certain circumstances. The leaseholder would be responsible for consulting with the CDPHE Air Pollution Control Division to determine if their activities and operations are subject to Construction Permit requirements.

The NESHAPs Subpart B regulations, “National Emission Standards for Radon Emissions from Underground Uranium Mines,” apply to an underground uranium mine that “(a) Has mined, will mine or is designed to mine over 100,000 tons of ore during the life of the mine; or (b) Has had or will have an annual ore production rate greater than 10,000 tons, unless it can be demonstrated ... that the mine will not exceed total ore production of 100,000 tons during the life of the mine.” For any mine meeting this definition, the leaseholder must comply with the emission standard for radon-222 as required at 40 CFR 61.22 and is subject to the annual NESHAPs Subpart B reporting requirements as outlined at 40 CFR 61.24.

All leaseholders would provide copies of all regulatory correspondence (including permits and applications, Air Pollutant Emissions Notices, Fugitive Dust Control Plans, NESHAPs annual reports) to the DOE Uranium Leasing manager.

#### **5.4.2 Existing Program Alternative**

The Existing Program alternative would also result in localized air quality impacts similar to those expected under the Expanded Program alternative. Under the Existing Program alternative, localized air quality impacts also would be attributable to the fugitive dust and visible emissions resulting from surface disturbances associated with mining and truck hauling and, to a lesser extent, from engine emissions produced from on-site equipment and haul trucks. It is anticipated that, although the *types* of air quality impacts would be similar to those described for the Expanded Program alternative, the severity of those impacts would decrease proportionately by the number of leases actively worked.

#### **5.4.3 No Action Alternative**

Short-term increases in fugitive dust would occur under the No Action alternative during reclamation of the lease tracts; however, regional air quality would not be adversely affected. Over the long term, local air quality would improve slightly from the reclamation of disturbed lands.

### **5.5 Ground Water**

#### **5.5.1 Expanded Program Alternative**

Under the Expanded Program alternative, mining operations would be expanded to encompass the inactive lease tracts. Preoperational, operational, and postoperational activities under the Expanded Program alternative are not expected to adversely affect ground water resources on any of the lease tracts. The shallowest significant ground water is in the Entrada Sandstone. Because this aquifer is generally several hundred feet below the surface at all lease tracts, surface-disturbing activities would have no effect on the aquifer. Downward percolation of recharge water, which could infiltrate at the surface, would be slowed considerably by the presence of the thick (several hundred feet), relatively impermeable mudstones and siltstone beds of the Brushy Basin Member of the Morrison Formation. The Entrada aquifer is hydrologically

separated from the surface by the Brushy Basin and Salt Wash Members of the Morrison Formation and by the Wanakah Formation.

With the exception of mines on lease tracts 7, 9, and 13, ground water would not be present in notable amounts within the subsurface areas exposed during mining. In some cases, water would be brought into underground mines during drilling to prevent dust from becoming airborne and to remove cuttings from drill bits. This water would not be present in large enough quantities to transport mineral contaminants from the ore-bearing layer to underlying layers. The Entrada aquifer would not be affected because it is hydrologically isolated from the ore-bearing layer by the low-permeability Wanakah Formation, which directly overlies the Entrada.

In the existing mines on lease tracts 7 and 9, where water is present, ground water would continue to be pumped into surface treatment ponds. Therefore, it generally would not be available for seepage into underlying layers. Even if ground water were not pumped and removed, the underlying low-permeability layers would retard seepage of the ground water into the Entrada aquifer. If seepage into the Entrada aquifer were to occur over time, the small amount of ground water emanating from the ore-bearing layer would not affect ground water quality within the aquifer. At lease tract 13, ground water may require the installation of surface treatment ponds once mining activities resume.

## **5.5.2 Existing Program Alternative**

Under the Existing Program alternative, mining at existing lease tracts would continue until leases were terminated. As described under the Expanded Program alternative (Section 5.5.1) preoperational, operational, and postoperational activities under the Existing Program alternative are not expected to adversely affect ground water resources on any of the lease tracts.

## **5.5.3 No Action Alternative**

Under the No Action alternative, reclamation activities, including the removal of surface contaminants, would not affect the quantity or quality of ground water within any aquifer. The cessation of pumping at mines on lease tracts 7 and 9 would not adversely affect water quality in the underlying Entrada aquifer. The low-permeability Wanakah Formation would retard seepage of water into the Entrada aquifer. If seepage into the Entrada aquifer were to occur over time, the small amount of water emanating from the ore-bearing layer would not affect ground water quality within the aquifer.

# **5.6 Surface Water**

## **5.6.1 Expanded Program Alternative**

Under the Expanded Program alternative, DOE would restrict activities at existing mine sites so that they do not further encroach toward the Dolores River and new mining activities would not be allowed within 1/4-mile of the Dolores River. Additionally, DOE would exclude Tract 2 of lease tract 14 (which is extensively traversed by the Dolores River) from future leasing activities.

Stormwater management controls are required at all leaseholder operations to minimize the potential for erosion and transportation of contaminant-laden sediments. These stormwater management controls would be designed to reduce runoff from lease tract operations, thus

1 minimizing the amount of runoff reaching a perennial stream or river. Therefore, potential  
2 impacts to surface water sources from storm-water runoff would be negligible.

3  
4 Two existing mining operations (on lease tracts 7 and 9) have mine-water treatment systems  
5 (ponds), and other lease tracts under the Expanded Program alternative could require the  
6 construction of such systems. These treatment systems would be designed to receive discharge  
7 water from the underground and open-pit mines. The leaseholder would consult with USFWS to  
8 address any concerns that the agency might have. These treatment systems would be constructed  
9 in accordance with applicable regulations. Those regulations might require that the ponds be  
10 adequately lined, fenced, and possibly netted to ensure that wildlife and livestock and the  
11 environment are not adversely affected.

### 12 13 **5.6.2 Existing Program Alternative**

14 Under the Existing Program alternative, DOE would restrict activities at existing mine sites so  
15 that they do not further encroach toward the Dolores River and new mining activities would not  
16 be allowed within 1/4-mile of the Dolores River. Additionally, DOE would exclude Tract 2 of  
17 lease tract 14 (which is extensively traversed by the Dolores River) from future leasing activities.

18  
19 Stormwater management controls are required at all leaseholder operations to minimize the  
20 potential for erosion and transportation of contaminant-laden sediments. These stormwater  
21 management controls would be designed to reduce runoff from lease tract operations, thus  
22 minimizing the amount of runoff reaching a perennial stream or river. Therefore, potential  
23 impacts to surface water sources from stormwater runoff would be negligible under this  
24 alternative.

25  
26 Two existing mining operations (on lease tracts 7 and 9) have mine-water treatment systems  
27 (ponds), and other lease tracts under the Existing Program alternative could require the  
28 construction of such systems. These treatment systems would be designed to receive discharge  
29 water from the underground and open-pit mines. The leaseholder would consult with USFWS to  
30 address any concerns that the agency might have. These treatment systems would be constructed  
31 in accordance with applicable regulations. Those regulations might require that the ponds be  
32 adequately lined, fenced, and possibly netted to ensure that wildlife and livestock and the  
33 environment are not adversely affected.

### 34 35 **5.6.3 No Action Alternative**

36 Under the No Action alternative, stormwater management controls implemented by the  
37 leaseholder would prevent runoff from affecting nearby surface water sources and would be  
38 terminated upon remediation.

39  
40 Termination of mine dewatering activities under this alternative would eliminate the conveyance  
41 of water to the mine-water treatment system (ponds), thus eliminating point discharges to the  
42 environment associated with these ponds.

## **5.7 Soils**

### **5.7.1 Expanded Program Alternative**

Under the Expanded Program alternative, an estimated 450 acres of additional soil could be disturbed during preoperational and operational activities. Disturbance of the soil surface and removal of vegetation would increase the soil erosion potential. Adverse impacts would be minimized by incorporating erosion-control techniques (e.g., water bars, vegetation, erosion-control fabric, and land contours) in the construction design. Surface soil materials would be stockpiled as practicable during new or expanded mining activities to be used later during reclamation of disturbed sites.

### **5.7.2 Existing Program Alternative**

Under the Existing Program alternative, an estimated 110 acres of additional soil could be disturbed during preoperational and operational activities and result in the same consequences as described under the Expanded Program alternative in Section 5.7.1.

### **5.7.3 No Action Alternative**

Under the No Action alternative, soils that have already been incorporated into reclaimed areas would continue to develop and foster plant growth. Surface soil materials would be used as practicable during reclamation of lease tracts that have not already been reclaimed to establish a growth medium for plants. Recontouring and reseedling would also reduce the erosion potential of these areas and allow the existing soils to stabilize and mature.

## **5.8 Vegetation**

### **5.8.1 Expanded Program Alternative**

The Expanded Program alternative would result in additional disturbances to vegetation and cryptobiotic crusts. An estimated 450 of the 21,000 acres scattered throughout 38 lease tracts would be newly disturbed. These 450 acres would consist of previously undisturbed and reclaimed land. With the exception of the open pit mine on lease tract 7 (200 acres, currently being developed as an underground operation), surface disturbance from mining activities is limited to small acreages of less than 15 acres per mine site. For example, for the four mines currently in active production, approximately 1.5 percent of the lease tract acreage is disturbed by operations.

Construction of small structures, ventilation shafts, haul and access roads, portals, and drill holes would involve significant short-term, small-scale impacts to upland vegetation. The degree of impact would depend on the areas disturbed. More impacts would result from disturbance to diverse, healthy plant communities than to previously degraded or species-poor communities. Weed invasion would be expected to increase in disturbed areas, particularly before reclamation efforts are successful. Additionally, weed invasion would be expected to increase in areas where vehicle traffic would facilitate the spread of weed seed. DOE requires the leaseholders to be proactive in their control of weed infestations on their lease tracts. Additionally, DOE coordinates with county weed programs to facilitate the control of weed infestations along



1 county roads that access and traverse the lease tracts. Long-term impacts after successful  
2 reclamation would be similar to those of the No Action alternative (Section 5.8.3).

3  
4 Cryptobiotic soil crusts are fragile and can be destroyed by even minor activities such as foot  
5 traffic. They take decades to reestablish. Destruction of cryptobiotic crust can lead to increased  
6 soil erosion, decreased moisture-holding capacity, decreased nutrition to surrounding plants, and  
7 reduced seed germination (Belnap 1992). The risk of weed invasion can also be increased in  
8 areas of crust disturbance. Destruction of cryptobiotic crusts would result in small-scale but long-  
9 term impacts that would continue until crusts are reestablished.

10  
11 Impacts from vegetation disturbance would be greatest on lease tracts containing primarily  
12 undisturbed land (tracts 5A, 7A, 8A, 17, 17A, 19A, 20, and 23A). These areas are more likely to  
13 contain late-successional plant communities such as piñon-juniper woodland, sensitive species,  
14 and well-developed cryptobiotic crusts. Excellent quality piñon-juniper habitat is present on  
15 some of the lease tracts. Mature plant communities and crusts may also occur on lease tracts  
16 reclaimed prior to 1970 (portions of tracts 5, 7, 10, 11, 11A, 13, 13A, 14, 14A, 15, 15A, 16, 16A,  
17 19, 22A, 24, 25, 26, 26A, 27, and 27A). The lowest impacts to vegetation would occur on more  
18 recently reclaimed areas (portions of tracts 10, 12, 13A, 15, 15A, 16, 16A, 19, 22, 22A, 23, 23B,  
19 25, 26, 26A, and 27), where mature vegetation communities and crusts have not had sufficient  
20 time to redevelop. For all future leaseholder activities, DOE would restrict the time period in  
21 which the leaseholders can perform the bulk removal of vegetation, particularly piñon pine, to  
22 minimize the spread of the IPS beetle.

23  
24 Exploration and/or development in portions of lease tract 13 could adversely affect individuals of  
25 the Naturita milkvetch or Dolores River skeletonplant but is not likely to lead to listing of either  
26 species. Because there is suitable habitat for several sensitive plant species on several other  
27 tracts, unknown impacts could also occur. A threatened and endangered plant survey would be  
28 required by leaseholders as a part of their plan of operations, and impacts would be avoided or  
29 mitigated.

### 30 31 **5.8.2 Existing Program Alternative**

32 Under the Existing Program alternative, small-scale disturbances to vegetation associated with  
33 the development of currently authorized activities would be expected on up to 410 acres, most of  
34 which (300 acres) is currently disturbed or was disturbed by previous mining activities. Wetland  
35 vegetation, sustained by pumped ground water, would continue to grow in and around the  
36 containment ponds on lease tracts 7 and 9 while mining operations continued. Vegetation on  
37 inactive lease tracts would remain undisturbed, and vegetation communities in reclaimed areas  
38 would continue to mature. Specific impacts to disturbed areas and in areas with increased vehicle  
39 traffic would be similar to those of the Expanded Program alternative (Section 5.8.1). Long-term  
40 impacts after successful reclamation would be similar to those of the No Action alternative  
41 (Section 5.8.3).

### 42 43 **5.8.3 No Action Alternative**

44 Under the No Action alternative, reclamation activities would result in minimal short-term  
45 impacts. Newly reclaimed areas would be susceptible to the encroachment of noxious and  
46 nonnoxious weeds until mature stands were established, but this would be minimized with  
47 integrated weed control measures. Reclamation activities would result in beneficial impacts over

the long term because existing disturbed land (300 acres) would be revegetated to increase plant cover that favors desirable plant species. All disturbed areas would be reclaimed with the concurrence of BLM before restoring to the public domain. Over the long term, cryptobiotic soil crusts would form in the reclaimed areas, which would increase soil water-holding capacity and plant growth.

Mine abandonment on lease tracts 7 and 9 would entail removing existing ponds that currently hold pumped ground water. The ponds would be contoured and revegetated with upland plant species, replacing the wetland species currently associated with the ponds.

## **5.9 Wildlife**

### **5.9.1 Expanded Program Alternative**

The Expanded Program alternative would result in impacts to wildlife in approximately 750 total acres distributed over the 38 lease tracts (27,000 acres). Wildlife short-term habitat would be lost as a result of vegetation removal, surface disturbance, and blasting during preoperational and operational activities. Wildlife would be displaced by noise, light, traffic, and other human activities. Animals with large home ranges (e.g., deer, birds of prey, coyotes) would experience minimal impacts unless roads impeded migration between areas of critical range. Animals with small home ranges (e.g., rodents or lizards) would likely be displaced, and some individual mortality would be expected. A small number of animals may also be lost as a result of accidental road kill.

Foraging areas for large birds of prey may be slightly reduced, but roosting or nesting sites, some of which are located near lease tract areas, would not be affected. The occupied habitat of the Gunnison sage grouse, a state candidate species, overlaps the western portion of lease tract 9. Disturbance in this area is unlikely because the occupied habitat exists on the valley floor, not on the mesa top where mining activities are located. There is a small chance that the federal candidate species, the yellow-billed cuckoo, may occur in cottonwood-dominated portions of the Dolores River Canyon near the Slick Rock lease tracts. It is unlikely that these areas will be disturbed by operational activities, and impacts to this bird are also unlikely.

Because the area of surface construction activities is small and dispersed over a large geographic area it would be expected to have minimal impact on migratory bird populations. Because federal law prohibits the destruction of birds and nests, roads or other structures would be constructed during a time of year when no migratory birds are nesting in the area, or nesting areas would be located and avoided. Disturbance to prairie dog towns could result in negative impacts to burrowing owls, a state-listed threatened species known to occur on Calamity Mesa. If burrowing owls were found to be nesting at any actively worked lease tract, DOE would be required to avoid activities within a 0.25-mile buffer area of the nest during nesting and until mid to late August, in compliance with the Migratory Bird Treaty Act.

Two existing mining operations (on lease tracts 7 and 9) have mine-water treatment systems (ponds), and other lease tracts under the Expanded Program alternative could require the construction of such systems. These treatment systems would be designed to receive discharge water from the underground and open-pit mines. The leaseholder would consult with USFWS to address any concerns that the agency might have. These treatment systems would be constructed

1 in accordance with applicable regulations. Those regulations might require that the ponds be  
2 adequately lined, fenced, and possibly netted to ensure that wildlife and livestock and the  
3 environment are not adversely affected.

4  
5 Impacts to threatened, endangered, and sensitive fish in the Dolores River or downstream in the  
6 Colorado River would be highly unlikely due to the small scale of disturbances, implementation  
7 of stormwater controls, and lack of discharge into waterways during mining operations.

8  
9 The reopening of abandoned mine entrances and other structures could potentially result in  
10 disturbance to populations of sensitive species of bats, particularly Townsend's big-eared bats,  
11 spotted bats, and fringed myotis. The CDOW was consulted on this issue and provided guidance  
12 to minimize the effects that the reopening of these mines would have on the bats potentially  
13 inhabiting the mine workings. A copy of this guidance is provided in Appendix C. Surveys and  
14 mitigation measures (e.g., displacement to previously identified suitable nearby habitats) would  
15 lessen impacts, but the potential exists for impacts by some operational activities. Bats are  
16 discussed in more detail in Section 5.9.3. The eventual long-term reclamation of these areas after  
17 mining is completed would result in an overall increase in habitat for many of these species.

18  
19 Midget faded rattlesnakes, if they occur in the area, may also be affected by the reopening of  
20 abandoned mine entrances and other structures. Although the midget faded rattlesnake is a state-  
21 listed candidate species, its range and status are currently under discussion by regulating  
22 agencies.

## 23 24 **5.9.2 Existing Program Alternative**

25 Under the Existing Program alternative, wildlife would continue to be displaced by noise, light,  
26 traffic, and other human activities. A very small number of animals may also be lost as a result of  
27 accidental road kill. Some additional impacts to wildlife would be expected as presently  
28 authorized activities (e.g., installation of ventilation shafts or exploration drill roads) continue on  
29 active lease tracts. Due to the small acreages involved (410 acres spread over 13 lease tracts),  
30 animals with large home ranges (e.g., deer, birds of prey, coyotes) would not be negatively  
31 affected. Animals with small home ranges (e.g., rodents or lizards) would likely be displaced.  
32 Because federal law prohibits the destruction of birds and nests, roads or other structures would  
33 be constructed during a time of year when no migratory birds are nesting in the area, or nesting  
34 areas would be located and avoided. Small-scale construction activities, such as installation of  
35 fences, could be accomplished at any time if nests were located and avoided.

36  
37 Two existing mining operations (on lease tracts 7 and 9) have mine-water treatment systems  
38 (ponds), and other lease tracts under the Existing Program alternative could require the  
39 construction of such systems. These treatment systems would be designed to receive discharge  
40 water from the underground and open-pit mines. The leaseholder would consult with USFWS to  
41 address any concerns that the agency might have. These treatment systems would be constructed  
42 in accordance with applicable regulations. Those regulations might require that the ponds be  
43 adequately lined, fenced, and possibly netted to ensure that wildlife and livestock and the  
44 environment are not adversely affected.

45  
46 If presently authorized activities came to an end during the lease period, disturbed areas would  
47 be reclaimed, and habitat areas would be reestablished. The closure of mine entrances would

1 potentially destroy bat habitat. Issues relating to bat populations would be similar to those  
2 described under the No Action alternative in Section 5.9.3.

### 4 **5.9.3 No Action Alternative**

5 Under the No Action alternative, most area wildlife species would benefit over the long and short  
6 terms because cessation of operations would reduce or eliminate noise, traffic, and human  
7 activity from the lease tracts. Positive impacts to large mammals such as mule deer, elk,  
8 pronghorn antelope, and desert bighorn sheep would likely be small-scale because of the  
9 acreages involved. Small mammals and reptiles would likely benefit more in the reclaimed areas  
10 as habitat increased and improved after reclamation.

11  
12 A small number of birds and other wildlife species would be displaced with the elimination of  
13 ponds on lease tracts 7 and 9, which currently hold pumped ground water. It is likely that the  
14 displaced species would relocate to other riparian areas on or near the lease tracts.

15  
16 The closure of mine entrances would destroy potential habitat for many bat species. Although no  
17 bats are federally listed as threatened or endangered, many species are listed by the State of  
18 Colorado and/or BLM. These agencies are responsible for managing populations to ensure that  
19 they are not driven to federal listing, and DOE policy and environmental directives support this  
20 effort. Potential impacts to bats, as well as mitigation measures, vary widely according to site  
21 conditions. Before mine entrances are closed, a summer and winter bat survey would be  
22 conducted to determine the number and species of bats potentially occupying a site. Depending  
23 on the sensitivity of the species and the availability of other suitable habitat in the area,  
24 mitigation measures may be warranted, such as the installation of bat gates (mine closures that  
25 allow bats to pass in and out of a mine but prevent humans from entering) in the abandoned  
26 mines.

## 28 **5.10 Cultural Resources**

### 30 **5.10.1 Expanded Program Alternative**

31 Under the Expanded Program alternative, an estimated 450 acres of previously undisturbed land  
32 might be disturbed during preoperational and operational activities on the 38 lease tracts.  
33 Assuming average site densities of 13–17 sites per square mile, approximately 9 to 12 cultural  
34 resource sites would be expected to occur within the 450-acre area of new disturbance. The  
35 leaseholder would be required to inventory the areas targeted for disturbance and provide the  
36 inventory results to DOE and BLM (BLM is the surface-managing agency). If cultural resource  
37 sites eligible for inclusion in the National Register of Historic Places were present and were  
38 expected to be adversely affected, DOE, BLM, and the SHPO would negotiate a mitigation plan,  
39 and the leaseholder would be required to implement it. Surface disturbance would not be allowed  
40 until the mitigation plan was agreed upon and implemented. Mitigation might include (1)  
41 avoiding cultural sites, (2) monitoring cultural sites during surface-disturbing activities, or  
42 (3) mapping, documenting, or excavating cultural sites before they are disturbed. Some of the  
43 cultural sites would be avoided by the leaseholder. Those that could not be avoided could be  
44 destroyed, but information about the site would be preserved through data collection and  
45 documentation.

## **5.10.2 Existing Program Alternative**

Under the Existing Program alternative, an estimated 110 acres of previously undisturbed land might be disturbed during preoperational and operational activities on the 13 active lease tracts. Assuming average site densities of 13–17 sites per square mile, approximately two to three cultural resource sites would be expected to occur within the 110-acre area of new disturbance. As under the Expanded Program alternative, the leaseholder would be required to inventory the areas targeted for disturbance and provide inventory results to DOE and BLM. If cultural resource sites eligible for inclusion in the National Register of Historic Places were present and were expected to be adversely affected, DOE, BLM, and the SHPO would negotiate a mitigation plan, and the leaseholder would be required to implement it. Surface disturbance would not be allowed until the mitigation plan was agreed upon and implemented. Mitigation would be the same as that described under the Expanded Program alternative. Those cultural sites that could not be avoided by the leaseholder could be destroyed, but information about the site would be preserved through data collection and documentation.

## **5.10.3 No Action Alternative**

When the 13 leases expire, disturbed areas would be reclaimed, and no new surface disturbance would occur. Closure of roads on the lease tracts would reduce potential access by vandals to cultural sites and hence would positively affect cultural resources. The lack of new surface disturbances in the long term would have a beneficial effect on cultural resources, as cultural sites would not be disturbed.

## **5.11 Visual Resources**

### **5.11.1 Expanded Program Alternative**

Under the Expanded Program alternative, the primary impacts to visual resources would be from landscape disturbance associated with preoperational and operational activities on the 38 lease tracts; visible dust and barren areas would be the primary impacts. The severity of the visual impacts would depend on the location of the disturbance and its visibility from access roads or corridors. The visual character of the Dolores River Canyon WSA is not expected to be affected by lease tract activities because of the natural barriers that occur between the lease tracts and the WSA. Lease tract activities already occur within the viewshed of the Dolores River Canyon SRMA on lease tracts 13 and 13A, and additional disturbances to the landscape within the SRMA would likely occur under the Expanded Program Alternative. DOE would restrict activities at the existing mine sites so that they do not further encroach on the Dolores River, and new mining activities would not be allowed within 0.25-mile of the Dolores River. As a result, the visual landscape would continue to be adversely affected but should not deteriorate. The objective of the Visual Resource Management Class II designation, currently not being met within lease tracts 13 and 13A, would not be met in the future.

In areas outside the Dolores River Canyon SRMA, proposed activities are expected to meet the objectives of BLM's Visual Resource Management Class III objectives, in that no more than a moderate contrast in the landscape's form, line, texture, or color would occur from site activities.

The increase in haul-truck traffic (maximum of 37.5 trucks per hour in an 8-hour work day) on segments of the Colorado Scenic and Historic Byways, for most travelers, would not affect

visual resources along the byways. Truck traffic on state and federal highways is an everyday occurrence, and travelers tend to not notice expected and usual events, especially if their focus is on surrounding scenic landscapes. Residents that live along the scenic byways, particularly in remote areas, would likely notice the increase in truck traffic. For these people, the trucks would adversely affect their views of the landscape during the brief moment that the truck passes the residence.

### **5.11.2 Existing Program Alternative**

Under the Existing Program alternative, the primary impacts to visual resources would be the same as those described for the Expanded Program alternative, except that these impacts could occur on only 13 lease tracts, including lease tracts 13 and 13A within the Dolores River Canyon SRMA. Barren areas associated with existing mine sites and visible dust would be the primary impacts. Overall, proposed activities are expected to meet the objectives of BLM's Visual Resource Management Class III objectives, in that no more than a moderate contrast in the landscape's form, line, texture, or color would occur from site activities. DOE would restrict activities at these existing mine sites so that they do not further encroach on the Dolores River.

Under the Existing Program alternative, the increase in haul truck traffic (maximum of 12.5 trucks per hour in an 8-hour work day) on segments of the Colorado Scenic and Historic Byways, for most travelers, would not affect visual resources along the byways. Residents that live along the scenic byways would likely notice the increase in truck traffic. For these people, the trucks would adversely affect their views of the landscape during the brief moment that the truck passes the residence.

### **5.11.3 No Action Alternative**

When the 13 leases expire, the lease tracts would be reclaimed, and no new surface disturbances would occur. Mine site reclamation would have a positive effect on visual resources, because it would reduce landscape contrasts in form, line, texture, and color that had resulted from preoperational and operational activities. The lack of new surface disturbances in the long term would benefit visual resources, because the landscape would not be changed.

Under the No Action alternative, the increase in haul-truck traffic (maximum of 20 trucks per 8-hour work day during a period of approximately 10 days) on segments of the Colorado Scenic and Historic Byways, for most travelers, would not affect visual resources along the byways. Residents that live along the scenic byways might notice the increase in truck traffic. For these people, the trucks would adversely affect their views of the landscape during the brief moment that the truck passes the residence; the negative impact would occur for approximately 10 days.

## **5.12 Wilderness Areas**

### **5.12.1 Expanded Program Alternative**

Under the Expanded Program alternative, increased activity and active mining on lease tracts 8, 17, and 17A could adversely affect the Dolores River Canyon WSA. However, the likelihood of this occurring would be remote. These lease tracts are approximately 1 mile southeast of the WSA boundary (at varying locations) and are geographically separated from the WSA by deep canyons. Only activities occurring in the upper elevations of the lease tracts would be visible

1 from or within hearing distance of the WSA. Depending on the wind direction and velocity, a  
2 WSA visitor could potentially see dust or hear noise emanating from drilling activity on the lease  
3 tracts. Because drilling is typically short term, no long-term impacts would be expected from  
4 drilling. If mining were to occur on the lease tracts, operational activities would most likely  
5 occur at the lower elevations along the side slopes of Monogram Mesa and Wedding Bell and  
6 Radium Mountains. These activities would not be visible and likely would not be audible from  
7 the WSA.

#### 8 9 **5.12.2 Existing Program Alternative**

10 Under the Existing Program alternative, increased activity and active mining on lease tract 8  
11 could adversely affect the Dolores River Canyon WSA in a manner similar to that described  
12 above in the Expanded Program alternative.

#### 13 14 **5.12.3 No Action Alternative**

15 There would be no impacts to the Dolores River Canyon WSA under the No Action alternative  
16 because no new surface-disturbing activities would occur.

### 17 18 **5.13 Wild and Scenic Rivers**

#### 19 20 **5.13.1 Expanded Program Alternative**

21 The Expanded Program alternative would not affect any currently designated Wild and Scenic  
22 Rivers; neither the Dolores River nor the San Miguel River have any sections designated as Wild  
23 and Scenic. It is noted that BLM manages these rivers as though they did have wild and scenic  
24 river status. Lease tract activities already occur along the Dolores River (on lease tracts 13 and  
25 13A) in the Slick Rock area, and additional disturbances to the landscape would likely occur  
26 under the Expanded Program alternative. DOE would restrict activities at the existing mine sites  
27 so that they do not further encroach on the Dolores River, and new mining activities would not  
28 be allowed within 0.25-mile of the Dolores River. As a result, the wild and scenic nature of this  
29 section of the Dolores River would continue to be adversely affected but should not deteriorate.  
30 The noise associated with fans venting the mine workings would be considered intrusive by river  
31 float-trip participants; however, the duration would be brief in terms of the total river trip.  
32 Tract 2 of lease tract 14 is traversed extensively by the Dolores River and, for that reason, was  
33 specifically excluded from past leasing activities and will be excluded from such activities in the  
34 future.

#### 35 36 **5.13.2 Existing Program Alternative**

37 Under the Existing Program alternative, impacts to the wild and scenic nature of the Dolores  
38 River in the Slick Rock area would be similar to those described in the Expanded Program  
39 alternative. Lease tract activities at the existing mines on lease tracts 13 and 13A would be  
40 restricted so that they do not further encroach on the Dolores River, and new mining activities  
41 would not be allowed within 0.25-mile of the Dolores River. As a result, the wild and scenic  
42 nature of this section of the Dolores River would continue to be adversely affected but should not  
43 deteriorate.

### 5.13.3 No Action Alternative

There would be no impacts to the wild and scenic nature of the Dolores River under the No Action alternative because all mining activities would cease and the existing mine sites would be reclaimed.

## 5.14 Noise

This section addresses the impacts of noise to human receptors under the Expanded Program, Existing Program, and No Action alternatives. All noise impacts would be intermittent during the 10-year lease period of the Expanded Program and Existing Program alternatives and no more than 2 years under the No Action alternative.

### 5.14.1 Expanded Program Alternative

Noise associated with the Expanded Program alternative would come from mine operations and ore shipping. The largest sources of aboveground noise on the site would be heavy earth-moving equipment and haul trucks. Typical noise emissions from construction equipment such as mine trucks, front-end loaders, bulldozers, excavators, and other heavy equipment range from 70 to 85 dBA at a 50-ft distance (Table 5–7) (Parsons 2003). A combination of the loudest pieces of equipment would have a cumulative noise source of 95 dBA at a 50-ft reference distance. This is a worst-case assumption; because most equipment is operated underground, it would not result in maximum noise levels, and all the equipment would never be operating at the same point at the same time.

Table 5–7. Noise Levels (dBA) Used for Noise Assessment

Source of Noise	Reference Distance (ft)	Range of Measured Noise Levels (dBA)	Maximum Noise Level Estimate Used (dBA)
Loader	50	82	85
Bulldozer	50	85	85
Backhoe	50	80–82	85
Blade	50	85	85
Roller	50	82	85
Dump Truck	50	79	85
Concrete Truck	50	82	85
Truck at 60 mph	25	81–87	95
Truck at 30 mph	25	77–80	85
Car at 70 mph	25	76–78	80
Car at 35 mph	25	61–65	67
Freight Train	30	72–82	97

A maximum noise level of 95 dBA at 50 ft would produce a 1,480-ft radius of influence where 1-hour  $L_{eq}$  noise levels would exceed a 65 dBA nighttime noise standard. Since there are only a very limited number of residences, and no towns or cities within 1,480 ft of any of the lease tracts, and operations are typically not conducted at night, mine operations would not result in noise impacts to the public. Visitors to the area may notice operational noise if they are sufficiently close to mine operations. Noise from haul trucks transporting material to the mill in



Cañon City or White Mesa would have a similar estimated maximum noise level of 95 dBA at 50 ft. The haul-truck noise would attenuate to levels below a 65 dBA noise standard within 1,480 ft of county, state, or federal highways used to transport ore and that also currently support commercial truck traffic (see Section 4.3). Residents living on or near the collector routes used would experience noise from passing haul trucks. A resident near lease tract 13 at Slick Rock would experience the greatest amount of noise from the additional three haul trucks per hour traveling along the collector routes. At an average of 150 haul trucks per day under this alternative (or 300 round trips per 8-hour day), an individual adjacent to a highway used for mill shipments would experience noise from about 37 additional haul trucks per hour, conservatively assuming that all haul trucks used the same route and only traveled during an 8-hour day.

Noise from mining activities could disrupt wildlife in a small area around individual mine workings and along haul roads.

#### **5.14.2 Existing Program Alternative**

Noise at the 13 existing lease tracts under the Existing Program alternative would have the same noise sources and generate the same noise levels as those discussed under the Expanded Program alternative (see Section 5.14.1). As with the Expanded Program alternative, only a very limited number of residences, and no towns or cities are near enough to the 13 proposed lease tracts to be affected by noise from mining operations. Noise from mining activities could disrupt wildlife in a small area around individual mine workings and along haul roads and might be noticed by visitors to the area.

Noise from haul trucks traveling to the mills would generate the same noise levels per haul truck as under the Expanded Program alternative. Residents living on or near the collector routes used would experience noise from passing haul trucks. A resident near lease tract 13 at Slick Rock would experience the greatest amount of noise from the three additional haul trucks per hour traveling along the collector routes. At an average of 50 haul trucks per day (or 100 round trips per day) under the Existing Program alternative, an individual adjacent to a highway used for mill shipments would experience noise from 12 to 13 additional haul trucks per hour, conservatively assuming that all haul trucks used the same route and only traveled during an 8-hour day.

#### **5.14.3 No Action Alternative**

Until existing leases expire, operational noise resulting from closure activities at each mine site under the No Action alternative would be similar to noise resulting from surface activities under the Existing or Expanded Program alternatives and continue until reclamation was completed. Upon site closures, noise levels would return to naturally occurring background levels, and there would be no potential to disturb native wildlife.

### **5.15 Floodplains and Wetlands**

#### **5.15.1 Expanded Program Alternative**

Under the Expanded Program alternative, disturbance to any portion of the withdrawn areas is possible. Although portions of lease tracts 13, 13A, and 14 occur within the floodplain of the Dolores River, and portions of lease tracts 26 and 27 have intermittent flow from Calamity

Creek, operations are unlikely to occur within these areas. On lease tracts 13 and 13A, DOE would restrict activities at the existing mine sites so that they do not further encroach on the Dolores River. In addition, new mining activities proposed for all three lease tracts would not be allowed within 0.25-mile of the Dolores River. Furthermore, tract 2 of lease tract 14 is traversed extensively by the Dolores River and, for that reason, was specifically excluded from past leasing activities and will be excluded from such activities in the future. If individual activities within a floodplain or wetland were unavoidable, compliance with DOE's environmental review requirements, codified at 10 CFR 1022, in concert with the U.S. Army Corps of Engineers would be required.

### **5.15.2 Existing Program Alternative**

Although portions of lease tracts 13 and 13A are within the floodplain of the Dolores River, operational activities are unlikely to occur within this area under the Existing Program alternative. On these two lease tracts, DOE would restrict activities at the existing mine sites so that they do not further encroach on the Dolores River. In addition, new mining activities proposed for these lease tracts would not be allowed within 0.25-mile of the Dolores River. If individual activities within a floodplain or wetland were unavoidable, compliance with DOE's environmental review requirements, codified at 10 CFR 1022, in concert with the U.S. Army Corps of Engineers would be required.

### **5.15.3 No Action Alternative**

Wetland vegetation associated with the mine-water treatment systems (ponds) on lease tracts 7 and 9 would be lost as the result of the No Action alternative. However, these are temporary ponds and contain ground water pumped to the surface for mine dewatering operations and are not delineated jurisdictional wetlands.

## **5.16 Human Health**

### **5.16.1 Expanded Program Alternative**

**Public.** For the Expanded Program alternative, members of the public would not be allowed access to the mining sites. However, individuals located near mines or working in mines could be exposed to radon emissions from the mines.

EPA evaluated exposures from radon emissions for individuals located near uranium mines (EPA 1989). For underground uranium mines, radon concentrations for nearby individuals (within 0.33 to 33 miles) ranged from  $2.0 \times 10^{-6}$  to 0.0031 working levels (EPA 1989). Assuming that an individual was continuously exposed, this is equivalent to a probability of a latent cancer fatality of  $5.5 \times 10^{-8}$  to  $8.5 \times 10^{-5}$ , or about 5 chances in 100 million to 8 chances in 100,000. Over 10 years, the probability of a latent cancer fatality would range from  $5.5 \times 10^{-7}$  to  $8.5 \times 10^{-4}$ , or about 5 chances in 10 million to 8 chances in 10,000. For perspective, an individual has a lifetime probability of dying of cancer from all sources of about 220,000 in 1 million, or a risk of lung cancer of 60,000 in 1 million.

For surface uranium mines, radon concentrations for nearby individuals (within 0.15 to 15.5 miles) ranged from  $7.7 \times 10^{-9}$  to  $3.5 \times 10^{-5}$  working levels (EPA 1989). Assuming that an individual was continuously exposed, this is equivalent to a probability of a latent cancer fatality

of  $2.1 \times 10^{-10}$  to  $9.7 \times 10^{-7}$ , or about 2 chances in 10 billion to 1 chance in 1 million. Over 10 years, the probability of a latent cancer fatality would range from  $2.1 \times 10^{-9}$  to  $9.7 \times 10^{-6}$ , or about 2 chances in 1 billion to 1 chance in 100,000.

**Workers.** As discussed previously in Section 3.5, all uranium mines are required to conduct operations in accordance with MSHA regulations, which establish maximum levels of radon and radon-daughter products that workers can be exposed to. Over the period 1985 through 1989, the average occupational radiation dose for uranium miners in the United States was 350 mrem per year (UNSCEAR 2000). This radiation dose is equivalent to a probability of a latent cancer fatality of  $2.1 \times 10^{-4}$ , or about 2 chances in 10,000. Over 10 years, the probability of a latent cancer fatality would be  $2.1 \times 10^{-3}$ , or about 2 chances in 1,000.

For the Expanded Program alternative, there would be a total of 570 workers. Based on the 350 mrem per year average occupational radiation dose (UNSCEAR 2000), the collective radiation dose to these workers would be 200 person-rem. This collective radiation dose is equivalent to a probability of a latent cancer fatality of 0.12, or about 1 chance in 10. Over 10 years, it is estimated that there could be about 1 latent cancer fatality from the radiation exposure of these workers.

#### 5.16.2 Existing Program Alternative

**Public.** For the Existing Program alternative, members of the public would not be allowed access to the mining sites. However, individuals located near mine sites could be exposed to radon emissions from the mines. Radon exposures and latent cancer fatalities for individuals living near underground and surface uranium mines would be the same as those described under the Expanded Program alternative (Section 5.16.1).

**Workers.** The risk to an individual worker would be the same under this alternative as was described for the Expanded Program alternative in Section 5.16.1.

For the Existing Program alternative, there would be a total of 186 workers. Based on the 350 mrem per year average occupational radiation dose from UNSCEAR (2000), the collective radiation dose to these workers would be 65 person-rem. This collective radiation dose is equivalent to a probability of a latent cancer fatality of 0.039, or about 4 chances in 100. Over 10 years, the probability of a latent cancer fatality would be 0.39, or about 4 chances in 10.

#### 5.16.3 No Action Alternative

**Public.** Most of the lease tracts are readily accessible to members of the public by public roads and are not secured by fences or locked gates. Although members of the public are not permitted to permanently or temporarily reside on the lease tracts, some visitors may camp for one or more days. Other activities that bring public visitors to the lease tracts include hunting, hiking, and mountain biking. In general, a public visitor would not spend more than 2 weeks per year on the lease tracts.

An individual may be exposed to radiation on the lease tracts through three primary pathways: (1) external exposure to gamma radiation, (2) inhalation and ingestion of resuspended radioactive particulates, and (3) inhalation of radon and radon daughter products. To assess exposures to members of the public, an individual was assumed to camp on a mine-waste-rock

1 pile for 24 hours a day over a 14-day period. Lease tract 13 was selected for the assessment  
2 because it is the most accessible to the public and is near State Highway 141 and the historical  
3 community of Slick Rock. In addition, this area is popular with visitors for viewing desert  
4 bighorn sheep and for rafting the Dolores River. The radiation dose resulting from camping on  
5 lease tract 13 is considered representative of the amount of radiation an individual could be  
6 exposed to at any other lease tract because of the physical similarities of all the mine sites and  
7 mine-waste-rock piles.

8  
9 The uranium concentration in waste-rock at lease tract 13 is about 0.040 percent  $U_3O_8$ . This  
10 results in a radium-226 concentration of about 110 pCi/g in the waste rock, assuming that  
11 uranium is in equilibrium with its radioactive decay products (see Table 5–8). On the basis of  
12 calculations using the RESRAD computer code (Yu et al. 2001), the radiation dose from  
13 camping on waste rock was estimated to be 49 mrem per year. The most significant exposure  
14 pathway was external exposure from gamma radiation emitted from the mine-waste-rock pile,  
15 which caused over 90 percent of the radiation dose. This radiation dose is equivalent to a  
16 probability of a latent cancer fatality of  $2.9 \times 10^{-5}$ , or about 3 chances in 100,000.

17  
18 *Table 5–8. Radionuclide Concentrations in Waste Rock at Lease Tract 13*  
19

Radionuclide	Concentration in Waste Rock (pCi/g)
Uranium-238	110
Uranium-234	110
Thorium-230	110
Radium-226	110
Lead-210	110
Uranium-235	5.3
Protactinium-231	5.3
Actinium-227	5.3

20 Concentrations are based on a uranium concentration of 0.040 percent  $U_3O_8$ . Concentrations also  
21 assume that uranium-238 and uranium-235 are in equilibrium with their radioactive progeny.  
22  
23

24 After a mine site was reclaimed, the potential for exposing members of the public to radiation  
25 from waste rock would be reduced. The degree to which exposures would be reduced would  
26 depend on the reclamation method used—some methods would involve removal and burial of  
27 radioactive sources, whereas other methods would involve only recontouring and seeding. For  
28 both methods, the potential for radiation exposures after reclamation is expected to be negligible.  
29

30 **Workers.** At the present time, mine workers typically visit the inactive lease tracts for  
31 approximately 3 hours each month, or for a total of 36 hours per year. These workers may also  
32 be exposed through external exposure to gamma radiation, inhalation and ingestion of  
33 resuspended radioactive particulates, and inhalation of radon and radon daughter products. On  
34 the basis of calculations using the RESRAD computer code (Yu et al. 2001) and the uranium  
35 concentrations from lease tract 13, the radiation dose for these workers was estimated to be  
36 5.3 mrem per year. This radiation dose is equivalent to a probability of a latent cancer fatality of  
37  $3.2 \times 10^{-6}$ , or about 3 chances in 1 million. Over 2 years, the probability of a latent cancer  
38 fatality would be  $6.4 \times 10^{-6}$ , or about 1 chance in 160,000.  
39

For the No Action alternative, there would be a total of 60 workers. The collective radiation dose to these workers would be 0.32 person-rem. This collective radiation dose is equivalent to a probability of a latent cancer fatality of  $1.9 \times 10^{-4}$ , or about 2 chances in 10,000. Over 2 years, the probability of a latent cancer fatality would be  $3.8 \times 10^{-4}$ , or about 1 chance in 2,600.

## **5.17 Environmental Justice Considerations**

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, states that federal programs and actions shall not disproportionately affect minority or low-income populations. None of the alternatives addressed in this EA would adversely affect any particular cultural or socioeconomic group of people more than the population as a whole. The populations of the communities that would most likely be affected by the alternatives are culturally and economically diverse.

## **5.18 Short-Term Uses Versus Long Term Impacts**

The use of a few hundred acres of land over the next decade for uranium-mining surface facilities across the region encompassing DOE's uranium lease tracts would not result in long-term impacts to the biological or human environment under any of the alternatives assessed in this EA. DOE requires the leaseholders to adequately address post-operation reclamation activities as part of their plans of operations, and the leaseholders are required to post reclamation performance bonds with DOE to ensure that the reclamation activities are performed. These bonds are lease-specific, and the amounts are calculated periodically and assessed by DOE based on site conditions and existing environmental regulations. Past experience has demonstrated that disturbed lands in this region can be successfully reclaimed.

## **5.19 Irreversible or Irretrievable Commitment of Resources**

As with any mineral extraction, uranium mining on DOE's lease tracts would result in the irreversible extraction of uranium and vanadium ores. As a result, these uranium and vanadium resources would not be available for future extraction and use. Other than fuel used to extract and transport the ore, there would be no other irreversible or irretrievable commitment of resources under any of the alternatives assessed in this EA.

## **5.20 Comparison of Alternatives**

Under the Expanded and Existing Program alternatives, the intensity of activity and the duration of the program (10 years) would not seriously affect the resources identified in this section over the long term. The Expanded Program alternative would have slightly larger surface impacts than the Existing Program alternative, requiring approximately 450 acres of new surface disturbance, but would also have a larger positive socioeconomic impact from the employment of approximately 570 mine workers and subsequent indirect economic benefits from secondary spending. Operations that would occur under the Existing Program alternative would result in a negligible increase in overall activity within the lease tract region. The total area of surface disturbance within the 13 lease tracts is expected to be no more than 410 acres, of which 300 acres is already disturbed. As a result of the increased activity, the socioeconomics of nearby communities would be enhanced through the direct employment of approximately 186 mine workers and indirectly through indirect expenditures on equipment, supplies, lodging, and other

needs. Both action alternatives would increase haul-truck traffic within the region, including on routes to the uranium mills. Although there would be large increases in haul-truck traffic along many highway segments (see Section 5.2), these increases would generally occur in sparsely populated areas, and the predicted impacts would result in less than one additional fatal accident.

Under the No Action alternative, most resources would realize a net positive impact, primarily through reducing access to remote areas of the lease tracts and reclaiming roads that historically have served the lease tracts. Socioeconomics would be adversely affected over the long term by the elimination of work opportunities associated with exploration and mining activities on the lease tracts.

Table 5–9 summarizes the potential impacts to all affected elements of the environment that could occur under each alternative across all impact areas. Table 5–10 identifies the potential for impacts at each DOE lease tract to support the programmatic decision-making that will use this EA. Should DOE decide to continue with the ULP, Table 5–10 would provide summary information for more detailed environmental evaluations specific to each lease tract (see Section 3.5 for the review and approval process for leaseholders' plans).

*Table 5–9. Summary of Environmental Impacts*

	<b>Expanded Program</b>	<b>Existing Program</b>	<b>No Action</b>
<b>Socioeconomics</b>	Up to 570 additional jobs would be created; local wages and secondary wages would increase.	Up to 186 additional jobs would be created; local wages and secondary wages would increase.	Up to 60 short-term jobs would be created. After 1 to 2 years, these jobs would be terminated.
<b>Transportation</b>	Up to 150 haul trucks per day (one way) would be transporting ore to the milling facilities. Depending on the road segment, these trucks could represent an increase in total traffic from 0 to 85 percent and an increase in truck traffic from 1 to 478 percent. This increase in heavy truck traffic will result in approximately 0.63 fatality and 16 injuries per year. Radiation exposures to truck drivers and members of the public would be negligible. In addition, there would be increases in the amount of noise and dust along the haul routes and in the number of vehicle/animal accidents that would likely occur.	Up to 50 haul trucks per day (one way) would be transporting ore to the milling facilities. Depending on the road segment, these trucks could represent an increase in total traffic from 0 to 23 percent and an increase in truck traffic from 7 to 137 percent. This increase in heavy truck traffic will result in approximately 0.13 fatality and 5.4 injuries per year. Radiation exposures to truck drivers and members of the public would be negligible. In addition, there would be increases in the amount of noise and dust along the haul routes and in the number of vehicle/animal accidents that would likely occur.	Up to 20 haul trucks per day (one way) would be transporting ore (current stockpiles) to the milling facilities for a period of 10 days. This increase in heavy truck traffic would result in approximately 0.002 fatality and 0.1 injury during the period. Radiation exposures to truck drivers and members of the public would be negligible. In addition, there would be increases in the amount of noise and dust along the haul routes and in the number of vehicle/animal accidents that would likely occur.
<b>Mining</b>	Uranium and vanadium ores would be immediately available; new reserves might be discovered. All mines would be reclaimed when program ends.	Uranium and vanadium ores would be immediately available; new reserves might be discovered. All mines would be reclaimed when program ends.	Uranium and vanadium ores would continue to be available over the long term but not from DOE leases. All mines would be reclaimed.

Table 5–9 (continued). Summary of Environmental Impacts

	Expanded Program	Existing Program	No Action
<b>Recreation</b>	Increases in mining-related traffic on local roads, including haul trucks, could impact recreationists. Increases in noise, dust, and human activity could impact recreationists, especially near the Dolores River Canyon SRMA.	Increases in mining-related traffic on local roads, including haul trucks, could impact recreationists. Increases in noise, dust, and human activity could impact recreationists, especially near the Dolores River Canyon SRMA.	Recreation activities may increase in lease tract areas as a result of decreases in noise, dust, and human activity.
<b>Timber Harvesting</b>	A small number of piñon pine and juniper trees would be removed. DOE would restrict the time period in which leaseholders could perform the bulk removal of vegetation, particularly piñon pine, to minimize the spread of the IPS beetle.	A small number of piñon pine and juniper trees would be removed. DOE would restrict the time period in which leaseholders could perform the bulk removal of vegetation, particularly piñon pine, to minimize the spread of the IPS beetle.	No impacts to timber resources would occur.
<b>Agriculture and Grazing</b>	Nine to 15 AUMs would be lost from new surface-disturbance activities.	One to two AUMs would be lost from new surface-disturbance activities.	Six to 10 AUMs would be gained from reclamation of existing disturbed land.
<b>Air Quality</b>	Local fugitive dust would increase slightly; regional air quality would not be affected.	Local fugitive dust would increase slightly; regional air quality would not be affected.	Local air quality would improve slightly from reduction of fugitive dust; regional air quality would not be affected.
<b>Ground Water</b>	Ground water quality would not be expected to be affected by surface or underground mining operations.	Ground water quality would not be expected to be affected by continued operations.	Ground water quality would not be expected to be affected by postoperational activities.
<b>Surface Water</b>	Surface water quality would not be expected to be affected by surface or underground mining operations. DOE would restrict operations and will not lease part of lease tract 14 near the Dolores River at Slick Rock so further encroachment does not occur and the river corridor does not deteriorate.	Surface water quality would not be expected to be affected by surface or underground mining operations. DOE would restrict operations near the Dolores River at Slick Rock so further encroachment does not occur and the river corridor does not deteriorate.	Dewatering ponds receiving ground water discharge would be eliminated.
<b>Soils</b>	An estimated 450 acres of soil would be newly disturbed; erosion potential would be minimized by on-site controls. Reclamation would be performed at the end of the program.	An estimated 110 acres of soil would be newly disturbed; erosion potential would be minimized by on-site controls. Reclamation would be performed at the end of the program.	Existing areas of disturbed soils (300 acres) would be reclaimed; erosion potential would decrease.

Table 5–9 (continued). Summary of Environmental Impacts

	Expanded Program	Existing Program	No Action
<b>Vegetation</b>	An additional 450 acres of upland vegetation and cryptobiotic soil crusts could be disturbed project-wide. The degree of impact would depend on the areas disturbed. T&E and sensitive species surveys to be conducted. All impacts would be to small acreages. DOE would be proactive to control noxious weed infestations. Reclamation would be performed at the end of the program.	An additional 110 acres of upland vegetation and cryptobiotic soil crusts could be disturbed project-wide. The degree of impact would depend on the areas disturbed. T&E and sensitive species surveys to be conducted. DOE would be proactive to control noxious weed infestations. Reclamation would be performed at the end of the program.	Reclamation would result in beneficial impacts over the long term. DOE would be proactive to control noxious weed infestations. Artificially sustained wetland vegetation on lease tracts 7 and 9 would be lost.
<b>Wildlife</b>	Displacement of large and small mammals and birds associated with disturbance of 450 noncontiguous acres of additional land. T&E, sensitive, and special status species/habitat surveys to be conducted. Loss of bat habitat in inhabited abandoned mines and structures. Some individual mortality and loss of habitat for small animals. Migratory birds would be protected from adverse risk from any on-site ponds.	Displacement of large and small mammals and birds associated with disturbance of 110 non-contiguous acres of additional land. T&E, sensitive, and special status species/habitat surveys to be conducted. Loss of bat habitat if mine entrances are closed, but potential to increase habitat if bat gates are installed. Migratory birds would be protected from adverse risk from any on-site ponds.	Wildlife habitat would improve on lease tracts. Removal of ponds on tracts 7 and 9 would displace small number of animals, including birds. Loss of bat habitat if mine entrances are closed, but potential to increase habitat if bat gates are installed.
<b>Cultural/Historic Resources</b>	Approximately 9 to 12 cultural resource sites are expected to occur in areas of disturbance. If any were expected to be negatively affected, DOE, BLM, and SHPO would negotiate mitigation. Calamity Camp would be avoided.	Approximately 2 to 3 cultural resource sites are expected to occur in areas of disturbance. If any were expected to be negatively affected, DOE, BLM, and SHPO would negotiate mitigation. Calamity Camp would be avoided.	Cultural/historic resources are not expected to be disturbed.
<b>Visual Resources</b>	An increase in haul trucks along scenic byways would affect those visual resources. Visible dust and surface disturbance would increase.	An increase in haul trucks along scenic byways would affect those visual resources. Visible dust and surface disturbance would increase.	A limited increase in haul trucks along scenic byways would affect those visual resources. Visible dust and surface disturbance would decrease.
<b>Wilderness Areas</b>	The Dolores River Canyon WSA is not expected to be affected.	The Dolores River Canyon WSA is not expected to be affected.	The Dolores River Canyon WSA would not be affected.
<b>Noise</b>	Some increases in local noise levels would occur.	Some increases in local noise levels would occur.	Local noise levels would decrease over the long term.



Table 5–9 (continued). Summary of Environmental Impacts

	Expanded Program	Existing Program	No Action
<b>Wild and Scenic Rivers</b>	Impacts related to noise and visual changes would occur along various river segments. DOE would restrict operations and would not lease a portion of lease tract 14 near the Dolores River at Slick Rock so further encroachment does not occur and the river corridor does not deteriorate.	Impacts related to noise and visual changes would occur along various river segments. DOE would restrict operations near the Dolores River at Slick Rock so further encroachment does not occur and the river corridor does not deteriorate.	No impacts would occur.
<b>Floodplains and Wetlands</b>	Potential for disturbance to floodplain and wetland areas is not expected. DOE would restrict operations near the Dolores River at Slick Rock so further encroachment does not occur and the river corridor does not deteriorate.	Potential for disturbance to floodplain and wetland areas is not expected. DOE would restrict operations near the Dolores River at Slick Rock so further encroachment does not occur and the river corridor does not deteriorate.	Disturbance to floodplains is not expected.  Removal of ponds on tracts 7 and 9 would result in the loss of small acreage of wetland-type habitat.
<b>Human Health</b>	For a member of the public living near an underground mine, the probability of a latent cancer fatality over 10 years would range from $5.5 \times 10^{-7}$ to $8.5 \times 10^{-4}$ or 5 chances in 10 million to 8 chances in 10,000, and for a surface mine, over 10 years, the probability of a latent cancer fatality would range from $2.1 \times 10^{-9}$ to $9.7 \times 10^{-6}$ , or 2 chances in 1 billion to 1 chance in 100,000.  Radiation exposures to workers would not exceed MSHA values; however, for a workforce of 570, over 10 years, the probability of an additional latent cancer fatality would be about 1 above that which is generally associated with this population.	The public's exposure would be the same as the exposure in the Expanded Program alternative.  Radiation exposures to workers would not exceed MSHA values; however, for a workforce of 186, over 10 years, the probability of an additional latent cancer fatality would be 0.39 above that which is generally associated with this population.	The potential for human exposure to radiation from uranium mining operations on DOE lease tracts would not occur.  A member of the public that camped for 2 weeks on an unreclaimed mine-waste-rock pile would receive a radiation dose equivalent to a probability of an additional latent cancer fatality of $2.9 \times 10^{-5}$ above that which is generally associated with this population.
<b>Environmental Justice</b>	Disproportionate impacts would not occur to minority or low-income populations.	Disproportionate impacts would not occur to minority or low-income populations.	Disproportionate impacts would not occur to minority or low-income populations.

Table 5–10. Potential Impacts Across DOE Lease Tracts

	Uranium Lease Tract																																						
Sensitive Environmental Conditions	5	5A	6	7	7A	8	8A	9	10	11	11A	12	13	13A	14	14A	15	15A	16	16A	17	17A	18	19	19A	20	21	22	22A	23	23A	23B	24	25	26	26A	27	27A	
Would Uranium Mining:																																							
Adversely affect members of the public	P <sup>a</sup>	P <sup>a</sup>	P <sup>a</sup>	P <sup>a</sup>	N	N	N	N	P <sup>a</sup>	N	P <sup>a</sup>	P <sup>a</sup>	P <sup>a</sup>	P <sup>a</sup>	P <sup>a</sup>	P <sup>a</sup>	P <sup>a</sup>	P <sup>a</sup>	P <sup>a</sup>	P <sup>a</sup>	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	
Adversely affect surface water bodies	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	
Adversely affect ground water	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	
Adversely affect a source of drinking water	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	
Adversely affect property of cultural, historic, archaeological, or architectural significance	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>	P <sup>g</sup>		
Adversely affect traditional cultural properties	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	
Adversely affect federally listed threatened or endangered species or their habitat	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>	N <sup>h</sup>		
Adversely affect a State of Colorado Potential Conservation Area (PCA)	N	N	N	N	N	N	N	N	N	N	N	N	P <sup>c</sup>	P <sup>c</sup>	P <sup>c</sup>	P <sup>c</sup>	N	N	P <sup>c</sup>	P <sup>c</sup>	N	N	P <sup>c</sup>	N	P <sup>c</sup>	P <sup>c</sup>	N	N	N	N	N	N	N	P <sup>c</sup>	N	N	N	N	N
Adversely affect wetlands regulated under the Clean Water Act	N	N	N	N <sup>d</sup>	N	N	N	N <sup>d</sup>	N	N	N	N	N	N	N <sup>d</sup>	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Adversely affect areas having a special designation such as federally and state-designated areas (e.g., parks, recreation areas, forests, wild and scenic rivers)	N	N	N	N	N	N	N	N	N	N	N	N	P <sup>f</sup>	P <sup>f</sup>	P <sup>f</sup>	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	
Adversely affect SRMAs and ERMAs	N	N	N	N	N	N	N	N	N	N	N	N	P <sup>e</sup>	P <sup>e</sup>	P <sup>e</sup>	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	
Adversely affect prime or unique agricultural lands	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	
Occur in a floodplain	N	N	N	N	N	N	N	N	N	N	N	N	P <sup>b</sup>	P <sup>b</sup>	P <sup>b</sup>	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	P <sup>b</sup>	P <sup>b</sup> N	N	
Occur in or near areas of low income or minority populations	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	
Cause adverse socioeconomic effects	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	
Adversely affect air quality	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	

Y = Yes      N = No      P = Potentially      UN = Unknown

<sup>a</sup>Members of the public reside within 1–2 miles of parts of the lease tract.

<sup>b</sup>Parts of the lease tract lie within a floodplain.

<sup>c</sup>Parts of the lease tract overlap a PCA.

<sup>d</sup>Presence of wetland-type vegetation due to mine dewatering or storm-water accumulation, but not regulated wetlands.

<sup>e</sup>Parts of the lease tract lie within an SRMA.

<sup>f</sup>Parts of the lease tract lie within the Dolores River Wild and Scenic Study Area and within the Dolores River Canyon SRMA.

<sup>g</sup>Cultural sites potentially exist on all lease tracts. Should the ULP continue, leaseholders would be required to inventory the areas of proposed activities; if sites eligible to the National Register of Historic Places were found, develop a plan to protect or mitigate the sites.

<sup>h</sup>DOE would not allow leaseholders activities that would adversely affect federally listed threatened or endangered species or their habitat.

## 5.21 Cumulative Impacts

An assessment of cumulative impacts is a review of the impacts of DOE's proposed actions in the context of other existing actions, or reasonably foreseeable future actions, which are occurring or might occur within the region of impact during the 10-year duration of DOE's proposed actions. Because the region is remote and sparsely populated, mineral (mining, oil and gas) exploration, development, and production activities are the most likely actions that would continue (or be undertaken) in the region, in the reasonably foreseeable future, that would result in cumulative effects when combined with DOE's proposed ULP alternatives. Additionally as the regional population increases, the large tracts of public lands in the region might lead to a substantial increase in public recreation activities in the area.

An evaluation of other existing or future mining operations that would allow an accurate description of impacts from these actions is not currently feasible. BLM data indicate that the three counties encompassing DOE's lease tracts currently have over 3,500 valid uranium claims; most of them recently staked in the last year or two. Information on the operational status of these claims is not currently available and would likely be changing as favorable market conditions continue. Based on the past history of mining claims versus actual production (i.e., there are far more valid claims than mines in production) the number of these claims that might ultimately be put into production is too uncertain to estimate.

Other mining operations would result in increased numbers of employees, which would increase spending within the region but would also put an increased demand on housing and infrastructure of the small communities in the region. Additional operations would produce an increase in the number of workers commuting to work and the number of haul trucks transporting ore to processing facilities. Uranium mine production could outpace the capacity of the two existing mills and result in the construction of new mills.

Even though the status of current claims and future uranium mining on non-DOE lands is unknown, if activity levels on those lands are comparable to historical levels on DOE's lease tracts, the range of potential impacts can be estimated. For example, DOE estimates that under the Expanded Program alternative there would be 42 different mining operations (excluding the existing large open-pit mine) on its lease tracts. If just 42 claims (approximately 1.2 percent of the existing 3,500 claims in the region) were developed in a manner comparable to the development anticipated on DOE's lease tracts, then the impacts would likely be comparable to those evaluated in the Expanded Program alternative (i.e., 570 workers, 150 haul-trucks/ore shipments per day, 420 acres of land committed to mining). At the extreme, if all claims were brought into production, several thousand new workers would be needed, thousands of haul trucks could be on the county roads and state highways, potentially increasing traffic volume, noise, dust, and accident rates, and the acres of land and habitat affected would also number in the thousands. However, such an expansion may not be feasible, as additional milling capacity would be needed because the capacity of the two existing mills would be exceeded. Because DOE's 38 lease tracts would represent a small percentage of the total potential number of mining operations in the region, development of DOE's lease tracts would be a very small contributor to overall cumulative impacts should large numbers of non-DOE lease tracts come into production.

In addition to mining activities, there is also ongoing development of oil and gas reserves in the region. The extent of future development is unknown; however, currently six to ten drill rigs are

1 often operating at one time in the region of DOE's uranium lease tracts. Because (1) oil and gas  
2 exploration and development does not require large numbers of workers (less than 20 per drill  
3 rig); (2) the duration of their actions at an individual site is typically a matter of weeks and not  
4 years; and (3) pipeline transport is favored over truck; the increase in the workforce and the  
5 subsequent cumulative impacts on the regional infrastructure, socioeconomics, and truck traffic  
6 resulting from mining and oil and gas development would not be appreciably greater than those  
7 assessed under the Expanded Program alternative in this EA. Based on estimates provided by the  
8 BLM, oil and gas development requires an average of 7–10 weeks for construction, drilling, and  
9 completion. During this time, assorted heavy equipment and workers pick-up trucks would add  
10 to the traffic in the region. Although the workers would travel daily to a well location, the heavy  
11 equipment needs would not result in daily transit during this period, but brief periods of highly  
12 intensive (e.g. 5–10 trucks for a few days) heavy equipment travel. Depending upon the number  
13 of wells developed at any one time, localized traffic increases would likely be experienced in the  
14 region.

15  
16 Oil and gas development would result in additional land use and biological impacts in the region;  
17 however, as with uranium mining, oil and gas drill rig impacts are limited to the localized area of  
18 a drill pad (5–10 acres), which would be dispersed throughout the region. Additional linear  
19 impacts to land use might occur if additional access roads and transmission pipelines are  
20 developed. The cumulative effects on land use and biota in the region would be an increase in the  
21 acreage of public lands that would be affected by mineral exploration. However, based on the  
22 relatively small footprint of oil and gas development operations, such an increase would likely be  
23 in the hundreds and not thousands of acres scattered across the region.

24  
25 The potential for the spread of weed seed (including noxious weed seed) would increase with  
26 vehicle traffic associated with uranium mining on and off DOE lease tracts, and with vehicle  
27 traffic associated with oil and gas exploration. This potential would increase proportionately with  
28 the number of infested areas being accessed by vehicles. DOE requires the leaseholders to be  
29 proactive in their control of weed infestations on their respective lease tracts. Additionally, DOE  
30 coordinates with county weed programs to facilitate the control of weed infestations along  
31 county roads that access and traverse the lease tracts.

## 6.0 Persons and Agencies Consulted

Name	Title	Agency
Bruce Fowler	Geologist	Bureau of Land Management Grand Junction Field Office Grand Junction, Colorado
Aline Laforge	Archaeologist	
Ron Lambeth	Wildlife Biologist	
Britta Laub	Recreation Program Manager	
Dave Lehmann	Lands Supervisor	
Jane Ross Peterson	Associate Field Supervisor	
Jim Cooper	Outdoor Recreation Planner	
Julie Coleman	Archaeologist	Bureau of Land Management Uncompahgre Field Office Montrose, Colorado
Lynn Lewis	Geologist	
Teresa Pfifer	Lands Supervisor	
Barbara Sharrow	Area Manager	
Dave Kaufman	Associate Field Office Manager	
Jim Ferguson	Biologist	
Amanda Clements	Ecologist	
Julie Stotler	Recreation Planner	Bureau of Land Management San Juan Field Office Durango, Colorado
Dean Stindt	Range Conservationist	
Gary Thrash	Planning and Environmental Coordinator	
Loren Wickstrom	Geologist	
Kay Zillich	Hydrologist	Bureau of Land Management Dolores Public Lands Office Dolores, Colorado
Jamie Sellar Baker	Associate Field Manager	
Penny Wu	Recreation Lead	
Kristen Philbrook	Wildlife Biologist	
Cara Gildar	Ecologist	
Kathy Nickell	Supervisory Biologist	

<b>Name</b>	<b>Title</b>	<b>Agency</b>
Barb Osmundson	Fish and Wildlife Biologist/ Environmental Contaminants Specialist	
Ellen Mayo	Botanist	U.S. Fish and Wildlife Service Grand Junction, Colorado
Terry Ireland	Fish and Wildlife Biologist	
Kurt Broderdorp	Fish and Wildlife Biologist	
Kirk Navo	Wildlife Biologist/Western Bat Working Group	Colorado Division of Wildlife Monte Vista, Colorado

1

## 7.0 References

- Executive Order 13007 Indian Sacred Sites.
- Executive Order 13175 Consultation and Coordination with Indian Tribal Governments.
- 7 *Code of Federal Regulations* (CFR) 657. U.S. Department of Agriculture, Natural Resource Conservation Service, “Prime and Unique Farmlands,” January 1, 2005.
- 10 CFR 20. U.S. Nuclear Regulatory Commission, “Standards for Protection Against Radiation,” January 1, 2005.
- 10 CFR 760.1. U.S. Department of Energy, “Uranium leases on lands controlled by DOE,” January 1, 2005.
- 10 CFR 1021. U.S. Department of Energy, “National Environmental Policy Act Implementing Procedures,” January 1, 2005.
- 10 CFR 1022. U.S. Department of Energy, “Compliance with Floodplain and Wetland Environmental Review Requirements,” January 1, 2005.
- 30 CFR 57. U.S. Department of Labor, Mine Safety and Health Administration, “Safety and Health Standards—Underground Metal and Nonmetal Mines,” July 1, 2004.
- 57.5038. “Annual Exposure Limits.”
- 57.5039. “Maximum Permissible Concentration.”
- 57.5047. “Gamma Radiation Surveys.”
- 40 CFR 61. U.S. Environmental Protection Agency, “National Emissions Standards for Hazardous Air Pollutants,” July 1, 2005.
- 40 CFR 143.3. U.S. Environmental Protection Agency, “Secondary Maximum Contaminant Levels,” July 1, 2005
- 40 CFR 1500–1508. Council on Environmental Quality, regulations for implementing the procedural provisions of the National Environmental Policy Act, July 1, 2004:
1500. “Purpose, Policy, and Mandate”
1501. “NEPA and Agency Planning”
1502. “Environmental Impact Statement”
1503. “Commenting”
1504. “Predecision Referrals to the Council of Proposed Federal Actions Determined To Be Environmentally Unsatisfactory”
1505. “NEPA and Agency Decisionmaking”
1506. “Other Requirements of NEPA”
1507. “Agency Compliance”
1508. “Terminology and Index”
- 49 CFR 100–180. U.S. Department of Transportation, Research and Special Programs Administration, October 1, 2004.

1 59 *Federal Register* (FR) 7629. "Environmental Justice in Minority Populations and Low-  
2 Income Populations," Executive Order 12898, Vol 59, No. 32, February 16, 1994.  
3  
4 16 *United States Code* (U.S.C.). National Historic Preservation Act of 1966, as amended  
5 through 2000.  
6  
7 42 U.S.C. 4321–4347 et seq., National Environmental Policy Act.  
8  
9 AEC (U.S. Atomic Energy Commission), 1972. *Leasing of AEC Controlled Uranium Bearing*  
10 *Lands*, WASH-1523, September.  
11  
12 Belnap, J., 1992. "Potential Role of Cryptobiotic Soil Crusts in Semiarid Rangelands," presented  
13 at the Symposium on Ecology, Management, and Restoration of Intermountain Annual  
14 Rangelands, Boise, Idaho, May 18–22.  
15  
16 BLM (Bureau of Land Management), 1980. Colorado State Office Instruction Memorandum  
17 No. CO-80-392 to District Managers and Division Chiefs, from Acting State Director, Colorado,  
18 dated August 1, 1980, "AEC Withdrawals."  
19  
20 BLM (Bureau of Land Management), 1984. *San Juan/San Miguel Resource Management Plan*  
21 *and Environmental Impact Statement*, Montrose District, Montrose, Colorado.  
22  
23 BLM (Bureau of Land Management), 1985. *Draft Grand Junction Resource Area Resource*  
24 *Management Plan and Environmental Impact Statement*, Grand Junction District, Grand  
25 Junction, Colorado, March.  
26  
27 BLM (Bureau of Land Management), 1993. *Mesa Creek Coordinated Resource Management*  
28 *Plan*, Environmental Assessment CO–030–U–93–35, Uncompahgre Basin Resource Area,  
29 Montrose District, Montrose, Colorado.  
30  
31 Brattstrom, B.H., and M.C. Bondello, 1983. "Effects of Off-Road Vehicle Noise on Desert  
32 Vertebrates," in *Environmental Effects of Off-Road Vehicles, Impacts and Management in Arid*  
33 *Regions*, R.N. Webb and H.G. Wilshire, eds., Springer-Verlag, New York, New York.  
34  
35 CDLE (Colorado Department of Labor and Employment), July 22, 2005, available on the  
36 Internet at <http://www.coworkforce.com/lmi/ali/lfpag.asp>  
37  
38 CDNR (Colorado Department of Natural Resources), 1995. *Mineral Rules and Regulations of*  
39 *the Colorado Mined Land Reclamation Board*, Division of Minerals and Geology,  
40 Denver, Colorado.  
41  
42 CDO (Colorado Demography Office), 2005. Produced by U.S. Census Bureau Population  
43 Estimates Program, available for United States, states, and counties; last revised July 1, 2005;  
44 available on the Internet at <http://dola.colorado.gov/demog/demog.cfm>.  
45  
46 CDOT (Colorado Department of Transportation), 2000. *Crashes and Rates on State Highways,*  
47 *2040*, Transportation Safety and Traffic Engineering Branch, Denver, Colorado.



1  
2 CDOT (Colorado Department of Transportation), 2003.  
3 [http://www.dot.state.co.us/app\\_DTD\\_DataAccess/Traffic/index/cfm?fuseaction=TrafficMain&M](http://www.dot.state.co.us/app_DTD_DataAccess/Traffic/index/cfm?fuseaction=TrafficMain&MenuType=Traffic)  
4 [enuType=Traffic](http://www.dot.state.co.us/Traffic_Manuals_Guidelines/accidents_and_rates_book/Accident_and_Rates_Book_2003.pdf) (traffic) and  
5 [http://www.dot.state.co.us/Traffic\\_Manuals\\_Guidelines/accidents\\_and\\_rates\\_book/Accident\\_and](http://www.dot.state.co.us/Traffic_Manuals_Guidelines/accidents_and_rates_book/Accident_and_Rates_Book_2003.pdf)  
6 [\\_Rates\\_Book\\_2003.pdf](http://www.dot.state.co.us/Traffic_Manuals_Guidelines/accidents_and_rates_book/Accident_and_Rates_Book_2003.pdf) (crashes).  
7  
8 CDPHE (Colorado Department of Public Health and the Environment), 2002. "Classifications  
9 and Numeric Standards for Gunnison and Lower Dolores River Basins," Regulation No. 35,  
10 February 20.  
11  
12 U.S. Census Bureau, 2004. *County and City Day Book, 2000*, Available on the Internet at  
13 <http://www.census.gov/>  
14  
15 CGS (Colorado Geological Survey), 2003. *Ground Water Atlas of Colorado*, Special  
16 Publication 53, Denver, Colorado.  
17  
18 Chafin, D.T., 2003. *Effect of the Paradox Valley Unit on the Dissolved-Solids Load of the*  
19 *Dolores River near Bedrock, Colorado, 1988–2001*, United States Geological Survey Water  
20 Resources Investigation Report 02-4275, January.  
21  
22 Chandler, S.M., J.C. Horn, and A.D. Reed, 1990. *Cultural Resource Overview for the Proposed*  
23 *Trans Colorado Natural Gas Pipeline, Western Colorado and Northwestern New Mexico*,  
24 prepared for Woodward-Clyde Consultants, Oakland, California.  
25  
26 Colorado Natural Heritage Database, 2005. Available on the Internet at  
27 <http://www.cnhp.colostate.edu/>.  
28  
29 Cotter Corporation, 1979. *Cotter Corporation JDB7 Mine Plan* (loose-leaf notebook), Denver,  
30 Colorado.  
31  
32 DOE (U.S. Department of Energy), 1995. *Final Environmental Assessment for the Uranium*  
33 *Lease Management Program*, DOE/EA-1037, Grand Junction Projects Office, Grand Junction,  
34 Colorado, July.  
35  
36 DOE (U.S. Department of Energy), 1995. *Finding of No Significant Impact*.  
37  
38 Energy Policy Act of 2005 (Public Law 109-58). [www.archives.gov/federal-](http://www.archives.gov/federal-register/laws/current.html)  
39 [register/laws/current.html](http://www.archives.gov/federal-register/laws/current.html).  
40  
41 EPA (U.S. Environmental Protection Agency), 1989. *Risk Assessments, Environmental Impact*  
42 *Statement, NESHAPS for Radionuclides, Background Information Document*, Volume 2,  
43 EPA/520/1-89-006-1, Office of Radiation Programs, Washington, DC, September.  
44  
45 EPA (U.S. Environmental Protection Agency), 1991. *Diffuse NORM: Waste Characterization*  
46 *and Preliminary Risk Assessment*, Draft, Office of Radiation Programs, Washington, DC.  
47

1   FHA (Federal Highway Administration), 2005. *Highway Performance Management System*  
2   *Field Manual*, Office of Highway Policy Information, Federal Highway Administration,  
3   U.S. Department of Transportation, Washington, DC, May.

4  
5   IUC (International Uranium Corporation), 2003. *Description of the Affected Environment, White*  
6   *Mesa Mill, Blanding, Utah, for Transport by Slurry Pipeline and Disposal of the Moab Tailings*,  
7   Denver, May.

8  
9   Jacobs Engineering Group, Inc., 1994. *Environmental Assessment of Remedial Action at the*  
10   *Naturita Uranium Processing Site Near Naturita, Colorado*, prepared for the U.S. Department of  
11   Energy Uranium Mill Tailings Remedial Action Project Office, Albuquerque, New Mexico.

12  
13   Laforge, A., 2006. Personal communication between Aline Laforge, Archaeologist with BLM's  
14   Grand Junction Field Office, and DOE, Grand Junction Office of Legacy Management, Grand  
15   Junction, Colorado, regarding comments on the internal draft of the ULS Programmatic  
16   Environmental Assessment, April.

17  
18   Laub, B., 2005. Personal communication between Britta Laub, Geographic Information Systems  
19   Specialist with BLM's Grand Junction Field Office, and Marilyn Kastens, Environmental  
20   Scientist with S.M. Stoller Corporation, Grand Junction, Colorado.

21  
22   NCRP (National Council on Radiation Protection and Measurements), 1987. *Ionizing Radiation*  
23   *Exposure of the Population of the United States*, NCRP Report No. 93, Washington, DC.

24  
25   Parsons, 2003. *STPUD B-Line Phase III Export Pipeline Replacement Project*, California State  
26   Clearinghouse Number 2001122001, prepared by Parsons Corporation, Sacramento, California,  
27   June 30.

28  
29   White, D., 2006. Discussion with Dick White, Geologist for Cotter Corporation, about water in  
30   existing lease-tract mines.

31  
32   SEER 2005. Surveillance, Epidemiology, and End Results (SEER) Program  
33   (www.seer.cancer.gov) DevCan database: "SEER 13 Incidence and Mortality, 2000-2002,  
34   Follow-back year=1992, with Kaposi Sarcoma and Mesothelioma." National Cancer Institute,  
35   DCCPS, Surveillance Research Program, Cancer Statistics Branch, released April 2005, based  
36   on the November 2004 submission. Underlying mortality data provided by NCHS  
37   (www.cdc.gov/nchs).

38  
39   UDOT (Utah Department of Transportation), 2004.  
40   <http://www.dot.utah.gov/download.php/tid=1338/2004TrafficOnUtahHighways.pdf>.

41  
42   UNSCEAR (United Nations Committee on the Effects of Atomic Radiation), 2000. *Sources and*  
43   *Effects of Ionizing Radiation*, UNSCEAR 2000 Report to the General Assembly, with Scientific  
44   Annexes, *Volume I: Sources*, United Nations: New York.

45

1 U.S. Bureau of Reclamation, 1978. *Colorado River Basin Salinity Control Project, Paradox*  
2 *Valley Unit, Draft Environmental Statement*, Upper Colorado Regional Office, Salt Lake City,  
3 Utah.  
4  
5 U.S. Department of Interior, Colorado Bureau of Land Management, *Closure/Reclamation*  
6 *Guidelines for Abandoned Uranium Mine Sites*.  
7  
8 Utah Department of Workforce Services, September 8, 2005, available on the Internet at  
9 <http://jobs.utah.gov/wi/pubs/UnE/dwsdefault.asp>.  
10  
11 Wu, P., 2005. Personal communication between Penny Wu, Outdoor Recreation Planner with  
12 Dolores Public Lands Office, Dolores, Colorado, and Marilyn Kastens, Environmental Scientist  
13 with S.M. Stoller Corporation, Grand Junction, Colorado.  
14  
15 Yu, C., A.J. Zielen, J.-J. Cheng, D.J. LePoire, E. Gnanapragasam, S. Kamboj, J. Arnish,  
16 A. Wallo III, W.A. Williams, and H. Peterson, 2001. *User's Manual for RESRAD Version 6*,  
17 Report No. ANL/EAD-4, Argonne National Laboratory, Argonne, Illinois, July.  
18  
19

End of current text

**Appendix A**  
**Scoping Comments**

Table A-1. Issues Identified in Scoping

Scoping Issue	Response
Concern about increased truck traffic and accidents from ore shipments on narrow local roads.	Increases in truck traffic and accident rates are quantified under Section 5.2.
Request that all transportation routes be identified.	All reasonable routes for transporting ore from the lease tracts to the mills at White Mesa and Cañon City are shown on Figures 3-2 and 3-3.
Concern for human health from ore dust during transport to the mills.	Health consequences to miners, truck drivers, and the public are quantified in Section 5.16.
Concern for health risks to the public near uranium mill sites.	Milling operations and waste disposal were evaluated under site-specific U.S. Nuclear Regulatory Commission (NRC) NEPA documents and are performed under NRC licenses. Those issues are beyond the scope of this EA.
Concern about increasing waste volumes at the Cañon City milling site.	Milling operations are performed under existing federal and state licenses and are beyond the scope of this EA (see above).
Requested identification of air pollutants released by uranium mills.	The 30-day scoping period is consistent with that stipulated in DOE's NEPA regulations. The public will have additional opportunity to comment on the draft and final EA before DOE makes its decision.
Concern that the 30-day comment period was insufficient for public participation.	Because of the large area potentially affected by lease tract development and transportation, DOE will be making relevant project information available through the project's website rather than incurring the cost for reproduction and mailing of information to libraries. Consistent with federal requirements, specific information requests will be reviewed on a case-by-case basis.
Requested materials be made available in libraries.	DOE lease agreements require the leaseholders to reclaim their operations in accordance with applicable federal, state, and local statutes, rules, and regulations, including those associated with mine-site reclamation. Past reclamation activities show that mine sites can be successfully reclaimed. In addition, DOE and the State of Colorado require reclamation performance bonds for each lease tract to cover the costs of mine-site reclamation.
Concern about the final disposition and cost of wastes generated from mining or milling operations.	Milling operations are performed under existing federal and state licenses and are beyond the scope of this EA.
Miner safety and protective equipment requirements.	DOE lease agreements require leaseholders to conduct their operations in accordance with applicable federal, state, and local statutes, rules, and regulations, including those associated with worker protection.
Adverse environmental effects outweigh any benefits.	The purpose of this EA is to provide decision-makers with information on the environmental consequences of the proposed action. DOE will consider this information along with other relevant information in making its informed decision.
Energy Act of 2005 establishes nuclear power as part of the nation's future source of electricity, and therefore, access to DOE's managed lands is required.	Further clarification of DOE's responsibilities with regard to the uranium lease tracts is provided under Section 2.0, "Purpose and Need for Action."
Concern that all potentially affected parties were not notified of DOE's proposed action.	DOE placed announcements of this project in nine newspapers covering the readership from Cañon City to the White Mesa Mill and all towns and cities in the vicinity of the lease tracts. In addition, DOE mailed 70 news releases to appropriate federal, state, and local agencies, tribes, elected officials, libraries, and newspapers.
Government needs to do a more comprehensive job of notifying and listening to everyone who might pay for, as well as benefit from, the lease program.	

Table A-1 (continued). Issues Identified in Scoping

Scoping Issue	Response
Past experience with uranium mining and milling resulted in added costs to taxpayers for cleanup and compensation to workers for health effects.	Federal and state governments have learned from past experience and now require surety bonds sufficient to cover the cost of reclamation and apply regulations that protect the public and workers from exposures that could prove hazardous to their health.
Royalty payments to the government pale when compared to the costs of uranium mining and milling to the public and local governments.	Since 1974, DOE's lease agreements have contained provisions requiring the leaseholders to (1) obtain adequate reclamation performance bonds for their operations and (2) make production royalty payments to the government. The reclamation performance bonds required are, and have historically been, determined on a site-by-site basis. Since 1974, these bonds have been sufficient to ensure that the leaseholders operations are properly reclaimed. That requirement would continue for all future lease activities. Since 1974, DOE leases have generated approximately \$55 million in royalties to the government. These payments were deposited into the U.S. Treasury's general fund. These royalties did not specifically offset payments for the uranium workers compensation or directly affect abandoned uranium mine-site reclamation; however, it can be argued that there has been a significant, positive financial benefit to the government from past leasing activities. That benefit would also continue for all future leasing activities. Additional compensation is made annually to state and local governments via "payments in lieu of taxes" to offset the lack of property tax payments on federal lands.
Concern that 30 days is insufficient time to adequately assess all impacts.	The 30-day scoping period is the public's opportunity to have early input into the issues that should be addressed in the EA. It is not the preparation time needed to perform the analyses nor does it include the public's opportunity to comment on the draft EA.
Public meetings should have been held in other locations such as the east, central, and western regions of the lease areas, or Grand Junction, Montrose, Telluride, and Ridgway and advertised in local media.	Public meetings were held in the center of the lease tract area and near one of the two milling sites and were advertised in the newspapers representing the entire region that could be affected by the proposed actions from Cañon City, Colorado, to White Mesa, Utah.
Request that all lease tracts be evaluated for the presence of Potential Conservation Areas (PCAs) under the Colorado Natural Heritage Program.	Evaluation of the lease tracts and PCAs is provided in Section 4.9.
Successful reclamation is difficult in desert environments.	DOE concurs but notes that past reclamation efforts on lease tracts have been successful in reestablishing native vegetation.
Concern for the visual impact of residual waste rock left on the surface.	Visual impacts of lease tract development are discussed in Section 5.11.
Concern for storm-water management.	DOE lease agreements require the leaseholders to conduct their operations in accordance with applicable federal, state, and local statutes, rules, and regulations, including those associated with storm-water management.
Concern for control of noxious weeds.	The DOE lease agreements require the leaseholders to monitor and control infestations of noxious weeds. DOE has been coordinating weed-control efforts with various county weed programs since 1999. This requirement/coordination of effort would continue for all future leasing activities.
Increased demand on emergency services.	The potential impacts to local infrastructure are discussed in Section 5.1.
Applicability of federal, state, and local laws.	DOE lease agreements require the leaseholders to conduct their operations in accordance with applicable

Table A-1 (continued). Issues Identified in Scoping

Scoping Issue	Response
	federal, state, and local statutes, rules, and regulations.
Concern about resumption of uranium mining in Moffat County.	DOE has no uranium lease tracts in Moffat County, and the two available options for milling are not in Moffat County; therefore, the proposed actions of this EA have no potential to affect Moffat County.
Concern about the impacts of in situ leach mining.	Leaseholder operations have historically employed conventional mining/extraction techniques. Other proposed technologies, including in situ mining, would require a separate, comprehensive environmental review prior to being approved by DOE.
Workers will not be covered under the Radiation Exposure Compensation Act (RECA).	The commentor is correct in that RECA, Public Law 101-426, covers workers who worked in underground uranium mines located in Colorado, New Mexico, Arizona, Wyoming, South Dakota, Washington, Utah, Idaho, North Dakota, Oregon, and Texas at any time during the period beginning on January 1, 1942, and ending on December 31, 1971. However, based on that past experience, new federal and state standards have been established to protect workers from exposures that would be harmful to their health.
Request that if leases are to be issued, mining companies provide a surety bond to cover reclamation, air monitoring should be required during operations and independently verified, and medical screening should be provided for workers annually.	Surety bonds required by both DOE and the State of Colorado for each mine have been sufficient to cover the costs of reclamation since DOE began managing the program in the 1970s. Air monitoring and reporting is a federal and state requirement of all uranium mine operations in accordance with U.S. Mine Safety and Health Administration (MSHA) regulations. Worker monitoring and medical examinations are the responsibility of mine operators, but they must be in compliance with state and federal worker protection requirements.
Tract 14 is located on the Dolores River and should be withdrawn.	Tract 14 is one of the 38 tracts being evaluated in this EA and its proximity to the Dolores River is noted.
Tracts 26 and 26A have suitable habitat for burrowing owls and should be withdrawn.	Burrowing owls as well as other environmental features are considered in this EA and by DOE in its decision-making.
An Environmental Impact Statement (EIS) should be prepared instead of an EA to assess individual and cumulative impacts.	Consistent with DOE and CEQ NEPA regulations, DOE is preparing this EA, which assesses individual and cumulative impacts, to determine whether a finding of no significant impact (FONSI) is justified or whether an EIS is needed.
An economic assessment of the quality of Colorado's uranium resources compared to other deposits in the world should be generated to determine the sustainability of the business and the ability of the mining companies to perform reclamation.	Assessment of the economic viability of uranium mining in Colorado is the responsibility of the companies that bid for DOE's leases. DOE and state requirements for surety bonds ensure that sufficient funding is available for reclamation.
Past bonding levels were insufficient to reclaim a site. Historical cleanup cost should be used to set bond levels.	Since 1974, DOE's lease agreements have contained provisions requiring the leaseholders to obtain adequate reclamation performance bonds for their operations. The reclamation performance bonds required are, and have historically been, determined on a site-by-site basis. Since 1974, these bonds have been sufficient to ensure that the leaseholders operations are properly reclaimed. That requirement would continue for all future lease activities.
Effects of increased truck traffic on Telluride's tourism, workforce, and safety on Highway 62.	The potential increases in truck traffic volume and projected accident rates are discussed in Section 5.2. Worker and public health effects of transportation are discussed in Section 5.16.



Table A-1 (continued). Issues Identified in Scoping

Scoping Issue	Response
Emergency response times to mine sites and to all segments of the transportation routes.	Because of the remote locations of most lease tracts, mine operators recognize that they bear an added burden to ensure worker safety and are the first responders in the event of an accident. As a consequence of this remoteness, many miles of the transportation routes are also distant from emergency responders. However, as assessed in Section 5.2, the consequences from an accident involving uranium ore would not be appreciably different than those from any other truck accident in this region.
Training of emergency personnel for response to an accident involving radioactive materials.	As discussed in Section 5.16, the relatively low hazard levels associated with uranium ore would not necessitate special training for emergency responders. Hazardous material training is required for emergency responders; no additional training specific to radioactive materials is required for uranium ore shipments.
Concern for surface water quality where streams are adjacent to mines.	With few exceptions, mining operations on DOE lease tracts are located away from existing stream channels, and all mining operations are required to institute controls that are protective of surface waters. Also, when mining operations encounter ground water in sufficient quantity that it must be discharged to the environment, the leaseholder is required to obtain a discharge permit from the State of Colorado and comply with all requirements of that permit, including treating the water for radium or other constituents, if necessary.
Liners used in retention ponds deteriorate when in contact with radioactive materials.	Because there is no processing of uranium ores occurring at the mine sites, with the exception of a few mines requiring dewatering and radium removal before discharging, no lined ponds could be subjected to extended exposure to materials that would experience accelerated deterioration beyond normal design parameters.
Preventive measures required to prevent ground water and surface water contamination.  Potential to contaminate drinking water sources.	Most mines are dry; thus, there are no mechanisms for surface or ground water contamination. For those few mines that require dewatering, radium is removed, and the resultant ground water is discharged in accordance with State of Colorado permits.
Radioactive dust releases should be prevented from mines.	DOE lease agreements require the leaseholders to conduct their operations in accordance with applicable federal, state, and local statutes, rules, and regulations, including those associated with air emissions. Section 5.4 discusses air emissions and associated requirements.
Health risks from radon gas should be evaluated.	Health risks to the public and workers are assessed in Section 5.16.
Location of waste disposal from mines, mills, and nuclear power plants.	Mines sites are reclaimed in accordance with state and federal requirements. The two currently operating uranium mills dispose of their wastes onsite in accordance with their NRC licenses. Nuclear power plant wastes are or will be disposed of by waste types at commercial or government-operated waste disposal locations.

Table A-1 (continued). Issues Identified in Scoping

Scoping Issue	Response
How many jobs will be created?	Under ongoing operations at the 13 existing leases, approximately 186 direct jobs are estimated during the projected 10-year leases. For the Expanded Program alternative, approximately 570 jobs would be created during the projected 10-year leases. For the No Action alternative, approximately 60 employees would be required until all operations could be terminated, the sites reclaimed (estimated to require 2 years), and the properties transferred to BLM.
What type of job security will employees be provided and what will the industry give back to the communities?	Uranium mining, like all mineral development, is subject to market forces; thus, job security cannot be ensured. Industry contributions to local communities come from local purchases, sales taxes, housing taxes, and other forms of payments for needed services and materials. Additional compensation is made annually to state and local governments via "payments in lieu of taxes" to offset the lack of property tax payments on federal lands.
How will industry ensure communities will not demise when mines close?	As has been the case in the past, uranium mining, like all mineral development, is subject to market forces. The long-term viability of area communities is dependent on various industries (tourism, ranching, mineral development, etc.) and is not solely dependent on the uranium industry.
What standards are in place to protect workers and the public?	Several agencies have regulatory jurisdiction over activities conducted on or associated with the leasing program, including MSHA and Colorado Departments of Transportation (CDOT) and Natural Resources–Division of Minerals and Geology (CDMG).
What agency is responsible for worker safety and do they have the capacity to monitor all activities?	Employers are responsible for providing a safe work environment for their employees and must monitor that environment in accordance with applicable regulations. For mining, MSHA is the principal regulator. In accordance with the regulations, MSHA personnel perform periodic mine-site inspections.
What measures are in place to avoid downwind issues?	DOE lease agreements require leaseholders to conduct their operations in accordance with applicable federal, state, and local statutes, rules, and regulations, including those associated with air emissions. Typically, lease tract operations are so remote and the density of the materials handled is great enough that there are no downwind issues. However, health effects to the public and workers are assessed in Section 5.16.
What would be the effect on the tax base of the three counties containing mines?	Similar to any other industry that creates jobs within a specific area, lease tract operations will affect the tax base of the respective counties; however, a quantitative analysis of that effect is beyond the scope of this EA.
The economic impact on the local economy, including the impacts on recreational use of the Dolores River and traditional ranching communities.	Mining, ranching, and recreational interests have coexisted within the area containing the Uravan Mineral Belt for decades, each having some economic impact on the local economies. That situation will likely continue regardless of DOE's actions. Recreational use impacts are addressed in Section 5.3.2.
Impacts of mining, milling, transportation, cleanup and recovery, and waste disposal must be addressed.	The impacts of uranium mining on DOE's lease tracts and transportation to the currently available mills are evaluated in this EA.  The impacts of uranium milling are assessed as a part of the mills' licensing process by NRC and are beyond the scope of this EA.

Table A-1 (continued). Issues Identified in Scoping

Scoping Issue	Response
Has adequate cleanup of historical uranium mining occurred to warrant new leasing?	All historical (legacy) mine sites on DOE lease tracts have been successfully reclaimed.
DOE's actions must comply with BLM's resource management plans.	DOE works closely with BLM in implementing the leasing program. DOE and the BLM are working on a memorandum of understanding for long-term roles and responsibilities regarding the Uranium Leasing Program.
BLM's draft Resource Management Plan contemplates more protective management of the Dolores River corridor, which conflicts with lease tract 14, and therefore that tract should be withdrawn and others that may affect the potential for the river to be designated wild and scenic and/or are within 2 miles of the river should also be withdrawn.	Section 5.3.2 addresses recreational use impacts, and Section 4.15 discusses wild and scenic river status
Site-specific decision to allow exploration, mining, or milling of uranium should be conducted after completion of an EIS.	The DOE lease agreements require the leaseholders to submit exploration and/or mining plans to DOE for approval. The lease agreements also require the leaseholders to comply with all applicable federal, state, and local statutes, rules, and regulations. Accordingly, the leaseholder may be required to perform additional site-specific environmental surveys and provide the associated documentation to DOE for review. These requirements would continue for future leasing activities should DOE decide to continue with the Uranium Leasing Program.
Local land use and zoning laws should be examined that could limit mining development on adjacent private lands.	DOE's leasing decisions would affect only mining activities on federal lands and do not apply to mining actions on private lands.
DOE must coordinate with state public health agencies.	The Colorado Department of Public Health and Environment was a reviewing agency to DOE's EA in 1995 and will receive a copy of this EA to review as well.

## **Appendix B**

### **Plants and Wildlife Species Expected To Occur On or Near DOE Lease Tracts**

Table B-1. Common and Scientific Names of Plants Associated With DOE Lease Tracts

Scientific Name	Common Name
<i>Achillea millefolium</i> L.	common yarrow
<i>Achnatherum hymenoides</i> (Roemer & J.A. Schultes) Barkworth	Indian ricegrass
<i>Acroptilon repens</i> (L.) DC.	Russian knapweed
<i>Agropyron cristatum</i> (L.) Gaertn.	crested wheatgrass
<i>Amaranthus blitoides</i> S. Wats	mat amaranth
<i>Amelanchier utahensis</i> var. <i>utahensis</i> Koehne	Utah serviceberry
<i>Aristida purpurea</i> Nutt.	purple threeawn
<i>Artemisia frigida</i> Willd	fringed sagebrush
<i>Artemisia tridentata</i> Nutt.	big sagebrush
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> (Rydb.) Beetle	mountain big sagebrush
<i>Astragalus linifolius</i> Osterhout*	Grand Junction milkvetch*
<i>Astragalus naturitensis</i> Payson*	Naturita milkvetch*
<i>Astragalus rafaensis</i> ME Jones*	San Rafael milkvetch*
<i>Astragalus sesquiflorus</i> S. Wats.*	sandstone milkvetch
<i>Astragalus</i> sp.	milkvetch
<i>Astragalus wetherillii</i> M.E. Jones*	Wetherill's milkvetch*
<i>Atriplex canescens</i> (Pursh) Nutt.	fourwing saltbush
<i>Atriplex confertifolia</i> (Torr. & Frem.) S. Wats.	saltbush
<i>Balsamorhiza sagittata</i> (Pursh) Nutt.	arrowleaf balsamroot
<i>Bassia scoparia</i> (L.) A.J. Scott.	common kochia
<i>Bouteloua gracilis</i> (Willd. ex Kunth) Lag. ex Griffiths	blue grama
<i>Bromus inermis</i> Leyss.	smooth brome
<i>Bromus tectorum</i> L.	cheatgrass
<i>Cardaria draba</i> (L.) Desv.	hoary cress
<i>Castilleja</i> sp.	Indian paintbrush
<i>Cercocarpus ledifolius</i> Nutt.	curleaf mountain mahogany
<i>Cercocarpus montanus</i> Raf.	true mountain mahogany
<i>Chrysothamnus viscidiflorus</i> (Hook.) Nutt.	yellow rabbitbrush
<i>Convolvulus arvensis</i> L.	field bindweed
<i>Cryptantha</i> sp.	catseye
<i>Descurainia sophia</i> (L.) Webb ex Prantl	herb sophia
<i>Elaeagnus angustifolia</i> L.	Russian olive
<i>Elymus elymoides</i> (Raf.) Swezey	bottlebrush squirreltail
<i>Ephedra viridis</i> var. <i>viridis</i> Coville	Mormon tea
<i>Epipactis gigantea</i> Dougl. Ex Hook.*	helleborine*
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>nauseosa</i> (Pallas ex Pursh) Nesom & Baird.	rubber rabbitbrush
<i>Erigeron kachinensis</i> Welsh & Moore*	kachina daisy*
<i>Eriogonum</i> sp.	buckwheat
<i>Erodium cicutarium</i> (L.) L'Her. ex Ait.	redstem stork's bill
<i>Forestiera pubescens</i> var. <i>pubescens</i> Nutt.	forestiera
<i>Fraxinus anomala</i> Torr. ex S. Wats.	singleleaf ash
<i>Grindelia squarrosa</i> (Pursh) Dunal	curlycup gumweed
<i>Gutierrezia sarothrae</i> (Pursh) Britt. & Rusby	broom snakeweed
<i>Halogeton glomeratus</i> (Bieb.) C.A. Mey	halogeton
<i>Helianthus annuus</i> L.	common sunflower
<i>Hesperostipa comata</i> ssp. <i>comata</i> (Trin. & Rupr.) Barkworth	needle and thread grass
<i>Heterotheca villosa</i> var. <i>villosa</i> (Pursh) Shinnars	hairy goldenaster
<i>Hordeum jubatum</i> ssp. <i>jubatum</i> L.	foxtail barley
<i>Juniperus osteosperma</i> (Torr.) Little	Utah juniper
<i>Juniperus scopulorum</i> Sarg.	Rocky Mountain juniper
<i>Koeleria macrantha</i> (Ledeb.) J.A. Schultes	prairie Junegrass
<i>Krascheninnikovia lanata</i> (Pursh) Guldenstaedt	winterfat
<i>Lactuca serriola</i> L.	prickly lettuce
<i>Lactuca tatarica</i> (L.) C.A. Mey.	blue lettuce
<i>Lepidium latifolium</i> L.	broadleaved pepperweed
<i>Leymus salinus</i> (M.E. Jones) A. Love	saline wildrye
<i>Lupinus crassus</i> Payson*	Paradox lupine*
<i>Lygodesmia doloresensis</i> S. Tomb.*	Dolores River skeletonplant*
<i>Lygodesmia</i> sp.	skeletonplant
<i>Machaeranthera canescens</i> (Pursh) Gray	hoary aster
<i>Mahonia repens</i> (Lindl.) G. Don	Oregongrape
<i>Melilotus officinalis</i> (L.) Lam	yellow sweetclover
<i>Mimulus eastwoodiae</i> Rydb.*	Eastwood monkey-flower*
<i>Mirabilis multiflora</i> (Torr.) Gray	Colorado four o'clock

Table B-1 (continued). Common and Scientific Names of Plants Associated With DOE Lease Tracts

Scientific Name	Common Name
<i>Oenothera</i> sp.	primrose
<i>Opuntia polyacantha</i> var. <i>polyacantha</i> Haw	prickly pear
<i>Pascopyrum smithii</i> (Rydb.) A. Love	western wheatgrass
<i>Pediomelum aromaticum</i> (Payson) W.A. Weber*	Paradox breadroot*
<i>Penstemon</i> sp.	penstemon
<i>Peraphyllum ramosissimum</i> Nutt.	squaw apple
<i>Petradoria pumila</i> (Nutt.) Greene	grassy rockgoldenrod
<i>Phalaris arundinacea</i> L.	reed canarygrass
<i>Phlox longifolia</i> Nutt.	longleaf phlox
<i>Picrothamnus desertorum</i> Nutt..	bud sagebrush
<i>Pinus edulis</i> Engelm.	twoneedle piñon
<i>Pinus ponderosa</i> P. & C. Lawson	ponderosa pine
<i>Pleuraphis jamesii</i> Torr.	galleta grass
<i>Poa bulbosa</i> L.	bulbous bluegrass
<i>Poa secunda</i> J. Presl	Sandberg bluegrass
<i>Polypogon monspeliensis</i> (L.) Desf.	annual rabbitsfoot grass
<i>Populus fremontii</i> S. Wats	Fremont's cottonwood
<i>Prunus virginiana</i> var. <i>melanocarpa</i> (A. Nels) Sarg.	black chokecherry
<i>Psathyrostachys juncea</i> (Fisch.) Nevski	Russian wildrye
<i>Purshia tridentata</i> (Pursh) DC.	antelope bitterbrush
<i>Quercus gambelii</i> Nutt.	Gambel's oak
<i>Rhus trilobata</i> Nutt.	skunkbush sumac
<i>Rumex crispus</i> L.	curly dock
<i>Salix</i> sp.	willows
<i>Salsola kali</i> L.	Russian thistle
<i>Sarcobatus vermiculatus</i> (Hook.) Torr.	Greasewood
<i>Sclerocactus J.A.Purpus ex K. Schum, L. Bensen</i>	Uinta basin hookless cactus
<i>Sisymbrium altissimum</i> L.	tall tumbled mustard
<i>Sphaeralcea coccinea</i> (Nutt.) Rydb.	scarlet globemallow
<i>Sporobolus airoides</i> (Torr.) Torr	alkali sacaton
<i>Sporobolus contractus</i> A.S. Hitchc.	spike dropseed
<i>Sporobolus cryptandrus</i> (Torr.) Gray	sand dropseed
<i>Symphoricarpos longiflorus</i> Gray	desert snowberry
<i>Tamarix ramosissima</i> Ledeb.	saltcedar
<i>Tetradymia canescens</i> DC.	spineless horsebrush
<i>Thinopyrum intermedium</i> (Host) Barkworth & D.R. Dewey	pubescent wheatgrass
<i>Thinopyrum ponticum</i> (Podp.) Z.-W. Liu & R.-C. Wang	slender wheatgrass
<i>Thlaspi arvense</i> L.	field pennycress
<i>Typha latifolia</i> L.	broadleaf cattail
<i>Xanthium strumarium</i> L.	rough cocklebur
<i>Yucca baccata</i> Torr.	banana yucca
<i>Yucca harrimaniae</i> Trel.	Spanish bayonet

1

\*Sensitive species.

Table B-2. Wildlife Species Expected to Occur On or Near DOE Lease Tracts

Scientific Name	Common Name
<u>Fish</u>	
<i>Ameiurus melas</i>	black bullhead
<i>Catostomus discobolus</i>	bluehead sucker
<i>Catostomus latipinnis</i> *	flannelmouth sucker*
<i>Cottus bairdi</i>	mottled sculpin
<i>Cyprinella lutrensis</i>	red shiner
<i>Cyprinus carpio</i>	common carp
<i>Gila cypha</i> *	humpback chub*
<i>Gila elegans</i> *	bonytail*
<i>Gila robusta</i> *	roundtail chub*
<i>Ictalurus punctatus</i>	channel catfish
<i>Lepomis cyanellus</i>	green sunfish
<i>Notropis stramineus</i>	sand shiner
<i>Onchorhynchus mykiss</i>	rainbow trout
<i>Pimephales promelas</i>	fathead minnow
<i>Ptychocheilus lucius</i> *	Colorado pikeminnow*
<i>Rhinichthys osculus</i>	speckled dace
<i>Xyrauchen texanus</i> *	razorback sucker*
<u>Reptiles and Amphibians</u>	
<i>Ambystoma tigrinum</i>	tiger salamander
<i>Bufo punctatus</i>	red-spotted toad
<i>Bufo woodhousei</i>	Woodhouse's toad
<i>Cnemidophorus tigris</i>	northern whiptail
<i>Cnemidophorus velox</i>	plateau whiptail
<i>Coluber constrictor</i>	racer
<i>Crotalus viridis</i>	western rattlesnake
<i>Crotalus viridis concolor</i> *	midget faded rattlesnake*
<i>Crotaphytus collaris</i>	collared lizard
<i>Eumeces multivirgatus</i>	many-lined skink
<i>Gambelia wislizenii</i> *	leopard lizard*
<i>Hyla arenicolor</i>	common treefrog
<i>Phrynosoma douglassii</i>	short-horned lizard
<i>Pituophis melanoleucus</i>	gopher snake
<i>Rana pipiens</i> *	leopard frog*
<i>Scaphiopus intermontanus</i>	Great Basin spadefoot
<i>Sceloporus undulatus</i>	western fence lizard
<i>Selaporus graciosus</i>	sagebrush lizard
<i>Thamnophis elegans</i>	western terrestrial garter snake
<i>Urosaurus ornatus</i>	tree lizard
<i>Uta stansburiana</i>	side-blotched lizard
<u>Birds</u>	
<i>Accipiter gentiles</i> *	northern goshawk*
<i>Actitis macularia</i>	spotted sandpiper
<i>Aeronautes saxatalis</i>	white-throated swift
<i>Amphispiza belli</i> **	sage sparrow**
<i>Amphispiza bilineata</i>	black-throated sparrow
<i>Anas platyrhynchos</i>	mallard
<i>Aphelocoma coerulescens</i>	scrub jay
<i>Aquila chrysaetos</i> **	golden eagle**
<i>Archilochus alexandri</i>	black-chinned hummingbird
<i>Ardea herodias</i>	great blue heron
<i>Asio flammeus</i> **	short-eared owl**
<i>Athene cunicularia</i> *	burrowing owl*
<i>Bombycilla cedrorum</i>	cedar waxwing
<i>Bubo virginianus</i>	great horned owl
<i>Buteo jamaicensis</i>	red-tailed hawk

Table B-2 (continued). Wildlife Species Expected to Occur On or Near DOE Lease Tracts

Scientific Name	Common Name
<u>Birds (continued)</u>	
<i>Buteo regalis</i> *	ferruginous hawk*
<i>Buteo swainsonii</i> **	Swainson's hawk**
<i>Carduelis psaltria</i>	lesser goldfinch
<i>Carduelis tristis</i>	American goldfinch
<i>Carpodacus mexicanus</i>	house finch
<i>Cathartes aura</i>	turkey vulture
<i>Catherpes mexicanus</i>	canyon wren
<i>Ceryle alcyon</i>	belted kingfisher
<i>Centrocercus minimus</i> *	Gunnison sage grouse*
<i>Charadrius vociferus</i>	killdeer
<i>Chondestes grammacus</i>	lark sparrow
<i>Chordeiles minor</i>	common nighthawk
<i>Circus cyaneus</i> **	northern harrier**
<i>Coccyzus americanus</i> *	yellow-billed cuckoo*
<i>Colaptes auratus</i>	northern flicker
<i>Columba fasciata</i>	band-tailed pigeon
<i>Columba livea</i>	rock dove
<i>Contopus sordidulus</i>	western wood pewee
<i>Corvus brachyrhynchos</i>	American crow
<i>Corvus corax</i>	raven
<i>Dendroica nigrescens</i> **	black-throated grey warbler**
<i>Dendroica petechia</i>	yellow warbler
<i>Empidonax wrightii</i>	gray flycatcher
<i>Eremophila alpestris</i>	horned lark
<i>Euphagus cyanocephalus</i>	brewer's blackbird
<i>Falco mexicanus</i> **	prairie falcon**
<i>Falco peregrinus</i> *	peregrine falcon*
<i>Falco sparverius</i>	American kestrel
<i>Glaucidium gnoma</i>	northern pigmy owl
<i>Guiraca caerulea</i>	blue grosbeak
<i>Gymnorhinus cyanocephalus</i> **	piñon jay**
<i>Haliaeetus leucocephalus</i> *	bald eagle*
<i>Hirundo pyrrhonota</i>	cliff swallow
<i>Hirundo rustica</i>	barn swallow
<i>Icteria virens</i>	yellow-breasted chat
<i>Icterus galbula</i>	northern oriole
<i>Lanius ludovicianus</i>	loggerhead shrike
<i>Melanerpes lewis</i> **	Lewis's woodpecker**
<i>Meleagris gallopavo</i>	wild turkey
<i>Mimus polyglottos</i>	northern mockingbird
<i>Molothrus ater</i>	brown-headed cowbird
<i>Myiarchus cinerascens</i>	ash-throated flycatcher
<i>Otus trichopsis</i>	western screech-owl
<i>Passerculus sandwichensis</i>	savannah sparrow
<i>Passerina amoena</i>	lazuli bunting
<i>Phasianus colchicus</i>	ringnecked pheasant
<i>Pheucticus melanocephalus</i>	black-headed grosbeak
<i>Pica pica</i>	black-billed magpie
<i>Picoides villosus</i>	hairy woodpecker
<i>Pipilo erythrophthalmus</i>	rufous-sided towhee
<i>Poliophtila caerulea</i>	blue-gray gnatcatcher
<i>Poocetes gramineus</i>	vesper sparrow
<i>Salpinctes obsoletus</i>	rock wren
<i>Sayornis saya</i>	Say's phoebe
<i>Selasphorus playtcerus</i>	broad-tailed hummingbird
<i>Sialia currucoides</i>	mountain bluebird
<i>Sitta pygmaea</i>	pygmy nuthatch
<i>Spizella passerina</i>	chipping sparrow
<i>Stelgidopteryx serripennis</i>	northern rough-winged swallow
<i>Sturnella neglecta</i>	western meadowlark



Table B-2 (continued). Wildlife Species Expected to Occur On or Near DOE Lease Tracts

Scientific Name	Common Name
<u>Birds (continued)</u>	
<i>Tachycineta thalassina</i>	violet-green swallow
<i>Toxostoma bendirei</i>	Bendire's thrasher
<i>Troglodytes aedon</i>	house wren
<i>Turdus migratorius</i>	American robin
<i>Tyrannus verticalis</i>	western kingbird
<i>Vermivora virginiae**</i>	Virginia's warbler**
<i>Vireo gilvus</i>	warbling vireo
<i>Vireo solitarius</i>	solitary vireo
<i>Vireo vicinior**</i>	gray vireo**
<i>Zenaida macroura</i>	mourning dove
<u>Mammals</u>	
<i>Ammospermophilus leucurus</i>	white-tailed antelope ground squirrel
<i>Antilocapra americanus</i>	pronghorn antelope
<i>Antrozous pallidus</i>	pallid bat
<i>Bassariscus astutus</i>	ringtail
<i>Canis latrans</i>	coyote
<i>Castor canadensis</i>	beaver
<i>Cervus canadensis</i>	elk
<i>Citellus richardsoni</i>	Richardson's ground squirrel
<i>Citellus variegatus</i>	rock squirrel
<i>Dipodomys ordi</i>	Ord's kangaroo rat
<i>Eptesicus fuscus</i>	big brown bat
<i>Erethizon dorsatum</i>	porcupine
<i>Euderma maculatum*</i>	spotted bat*
<i>Eutamias minimus</i>	least chipmunk
<i>Felis concolor</i>	mountain lion
<i>Felis rufus</i>	bobcat
<i>Lasionycteris noctivagans</i>	silver-haired bat
<i>Lasiurus cinereus</i>	hoary bat
<i>Lepus californicus</i>	black-tailed cottontail
<i>Lutra canadensis</i>	river otter
<i>Mephitis mephitis</i>	striped skunk
<i>Mustella frenata</i>	long-tailed weasel
<i>Mustella nigripes*</i>	black-footed ferret*
<i>Mustella vison</i>	mink
<i>Myotis californicus</i>	California myotis
<i>Myotis ciliolabrum</i>	small-footed myotis
<i>Myotis evotis</i>	long-eared myotis
<i>Myotis lucifugus</i>	little brown myotis
<i>Myotis thysanodes*</i>	fringed myotis*
<i>Myotis velifer</i>	cave myotis
<i>Myotis volans</i>	long-legged myotis
<i>Myotis yumanensis</i>	Yuma myotis
<i>Neotoma lepida</i>	desert woodrat
<i>Odocoileus hemionus</i>	mule deer
<i>Ondatra zibethica</i>	muskrat
<i>Onychomys leucogaster</i>	northern grasshopper mouse
<i>Ovis canadensis mexicana</i>	desert bighorn sheep
<i>Perognathus flavus</i>	silky pocket mouse
<i>Peromyscus crinitus</i>	canyon mouse
<i>Peromyscus maniculatus</i>	deer mouse
<i>Peromyscus truei</i>	piñon mouse
<i>Pipistrellus hesperus</i>	western pipistrel
<i>Plecotus townsendii*</i>	Townsend's big-eared bat*
<i>Procyon lotor</i>	raccoon
<i>Spilogale putorius</i>	western spotted skunk
<i>Sylvilagus auduboni</i>	desert cottontail
<i>Sylvilagus nuttalli</i>	mountain cottontail

Table B-2 (continued). Wildlife Species Expected to Occur On or Near DOE Lease Tracts

Scientific Name	Common Name
<u>Mammals (continued)</u>	
<i>Tadarida brasiliensis</i>	Mexican freetail bat
<i>Tadarida molossa</i>	big freetail bat
<i>Taxidea taxus</i>	badger
<i>Thomomys talpoides</i>	northern pocket gopher
<i>Urocyon cinereoargenteus</i>	gray fox
<i>Zapus princeps</i>	western jumping mouse

\*Endangered, threatened, candidate, or sensitive species.

\*\*Birds of conservation concern.

## **Appendix C**

### **Guidelines for Bat Mitigation**

STATE OF COLORADO

Bill Owens, Governor  
DEPARTMENT OF NATURAL RESOURCES  
**DIVISION OF WILDLIFE**  
AN EQUAL OPPORTUNITY EMPLOYER

Bruce McCloskey, Director  
6060 Broadway  
Denver, Colorado 80216  
Telephone: (303) 297-1192



Ed Cotter, Site Lead  
Uranium Leasing Sites  
S.M. Stoller Corporation  
2597 B 3/4 Road  
Grand Junction, CO 81503

November 28, 2005

RE: Guidelines for bat mitigation at renewed mining sites in western Colorado.

Dear Ed;

Regarding our recent communications on the issue of bat mitigation at mines with bat gates undergoing renewed mining, I can offer the following comments for your use. I understand that mines that are currently gated to conserve bat roosting habitat, are potentially being re-opened for active mining operations with the recent increase in energy development in Colorado. While the best option to protect any bats using these sites, and preserve the roosting habitat that they provide, is to avoid re-entry into those features, I understand that is highly unlikely in most cases. However, any gated mine system that can be re-worked by other directions or ways that leave the system undisturbed, the best mitigation is to avoid re-entry of that feature and preserve the habitat. This would only seem possible with large mining systems that might leave portions un-disturbed. When avoidance is not possible, then the following guidelines should be considered.

1. Avoid re-entry into **winter** roosting sites (hibernacula) during the hibernation season of use. Bats are very vulnerable at this stage, and disturbance and mining activities can be both directly and indirectly deadly to bats roosting in these mines at that time. In western Colorado, where the uranium mines are located, the **winter season should be considered from October 1 – April 15**. Disturbance at winter roost sites can be greatly reduced by planning initial re-entry work around these dates. Once bats become active again, they can respond and disperse to the activity at the mine, hopefully avoiding any direct impact to individual bats.
2. Prior to re-entry into **winter/fall** roosting sites, exclusions should be conducted to help prevent the entry and use of the site by bats. This would involve screening out bats by placing chicken wire (1" mesh or more) across the entire bat gate, as well as any un-gated but open access point to the mine complex. The chicken wire should cover the gate from the top to about 5-6" from the floor or bottom of the gate. This will help prevent bats from entering the mine, and also allow any bats that may be inside the mine prior to the exclusion effort, to escape for the mine before the mining operations begin. I would suggest that exclusions begin by September 1 at these fall/winter sites. They can go up at any time prior to the start of the fall transition season, but no later than September 30, to avoid weather related variations to fall bat activity. In addition, exclusions are not functional from October 1 – April 15, because bats are not active.
3. **Summer** roosting sites, other than at maternity roost sites, can be handled in the same manner, with bat exclusions. I recommend that mines fitting this profile should have a chicken wire exclusion for at least 2-3 weeks prior to any re-entry of the mine. Again, the wire should cover the entire bat gate and any other un-

DEPARTMENT OF NATURAL RESOURCES, Russell George, Executive Director  
WILDLIFE COMMISSION, Jeffrey Crawford, Chair • Tom Burke, Vice Chair • Ken Torres, Secretary  
Members, Bernard Black • Rick Enstrom • Philip James • Claire O'Neal • Brad Phelps • Robert Shoemaker  
Ex Officio Members, Russell George and Don Ament

gated but open access point to the mine complex. **The summer season can be considered April 15 – September 1<sup>st</sup>.**

4. **Maternity roosts** will be the most critical, as these roosting habitats are very rare. Re-entry and potential loss of these roost types will require more advanced planning. I recommend that any maternity site that cannot be avoided for re-entry, undergo an exclusion effort by April 15. The ideal situation would be to allow the exclusion effort to cover the first half of the maternity season, at least, to prevent any attempt for the colony to try and re-establish use while operations are underway. That would provide an exclusion period of April 15 – June 15<sup>th</sup>. In addition, I would suggest that after re-entry of the mine for mining, that the portal(s) be covered during night time periods, to prevent the potential of re-use at maternity sites.
5. For sites that have **bat use year round**, the target time periods for renewed mining activity should be spring or fall. This would be an April-May period, or September-October time period.

Information on what type of roosting habitat is provided at a gated site can be obtained from me, or possibly, the BLM office with jurisdiction. In summary, disturbance at hibernation sites will cause bats to awaken, burning their fat reserves before food is again available in the spring. This will potentially lead to the death of those individuals. Smoke bombs are not recommended as exclusion methods, as to the best of my knowledge, they have not been confirmed to be effective. Additionally, use of these devices during the hibernation period would more than likely kill any roosting bats, as arousal from hibernation takes too much time to avoid the hazardous nature of the smoke fumes. Exclusions will only work during seasons when bats are active.

Consideration can be given to the potential of preserving any nearby mine features to serve as possible alternate habitat for bats. This may be more important during exclusion efforts. Lastly, the creation of artificial bat habitat has been attempted in some places, and it could serve as an important tool for conservation consideration. This would only be feasible for roost sites that are considered of the highest significance for bats, including maternity roosts and large hibernacula.

I hope these "guidelines" will be useful to you in your efforts to address this issue. The Division of Wildlife thanks you for your interest in minimizing impacts to bats with renewed mining activities in western Colorado. Please feel free to contact me if you have any questions.

Sincerely,



Kirk W. Navo  
Wildlife Conservation Biologist  
Monte Vista Service Center  
0722 S. Rd 1E  
Monte Vista, CO 81144  
719-587-6906